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The Catch of the Day



Attention Internet sports fans! Your regularly scheduled event for this morning, Web surfing, has been replaced by a new online activity: Webcasting. No, it's not some knockoff of an ESPN2 program on fly-fishing, and no, I'm not talking about a new way of finding actors for a Hollywood blockbuster. Webcasting

is the latest trend on the Net, in which content is delivered to your computer instead of you having to look for it.

Whether you call it "push" content, Web content delivery, Web broadcasting, or just plain Webcasting, the idea is catching on fast. It began last year, with an innovative product called the PointCast Network, an Internet "channel" that automatically gathers information from a variety of sources you select (news, local information, weather, stocks, and so on) and displays it in a viewer or a screen saver.

Webcasting provides a different feel from pointing your browser to a specific site and then following the hyperlinks to jump from page to page. It's more akin to television. Not surprisingly, Webcasting was an immediate hit, and last year we gave PointCast a Technical Excellence award for breaking new ground.

The success of PointCast prompted a rash of competitors to introduce products based on this concept of delivering content from the Internet to your computer. But we're beginning to see some interesting variations on the idea.

PointCast is really designed for those with a relatively fast, consistent Internet connection, such as a T1 line. A new product, Global Village's Newscatcher, uses the Air Media Live system to collect basic headlines and similar information over a pager network, leaving your phone lines and Internet connections unfettered. Other programs, such as Marimba's Castanet and BackWeb Technologies' BackWeb Channel Server, offer ways of automatically updating programs or other information on your computer while you're doing something else.

Other products, such as My Yahoo!, want to be your starting point on the Web. They collect information for

you, then let you surf the Web from there. Netscape's Inbox feature allows Web publishers to e-mail information to you. Perhaps the grandest scheme of all is Microsoft's Active Desktop, which promises to put Web content right on your Windows desktop. Netscape is following suit with its Constellation pack-age. (For details on many of these products, see our feature story "Online Con-

tent: The Web Delivers" on page 128.)

Suddenly, Web designers and publishers aren't talking about building Web sites; instead, they're talking about Web channels. Suddenly, everyone is convinced the Web won't be like print; instead, it will be like TV or radio.

Webcasting is extremely exciting, and I like the idea of getting the information I want delivered to me automatically. In fact, I want *PC Magazine* to be able to deliver our content to you that way should you want it.

But I do worry about the bandwagon effect. I don't believe broadcasting will ever replace special-interest publishing. Loads of places to get national news, sports, weather, and stocks already exist. What's so special about Web browsing is that you can search for and easily find information on just about any topic you can think of. Web surfing is active, as opposed to the more passive Web information delivery. True, if you're just nosing around the Web, browsing can be a major time killer. But when you want information on a very specific subject, Web surfing is much more efficient than Webcasting. To catch the right wave, you have to be willing to get wet.

I'm not willing to give up Web surfing, but there are plenty of times when I want the information to come to me. I'm sure I will get more ads or have to pay more for such a service, but I guess that's why it's called Webcasting; all of a sudden, I've been hooked by those delivering this information. And, of course, that's exactly the plan.

A stylized, handwritten signature of Michael J. Miller in black ink.

MICHAEL J. MILLER

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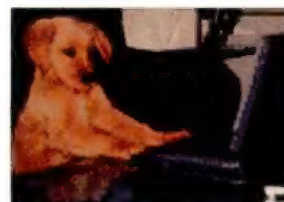


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COVER STORY



The Top 100 Web Sites

BY KAREN BANNAN

Some sites are simply better than others. Sometimes it's content, sometimes it's how easily the design takes you through everything, sometimes it's the way they use the latest whiz-bang technology to deliver something really

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cool. Some amazing sites combine all three [advantages. Here's our current take on the 100](#) most compelling sites on the Web, which we've divided into five subject areas. We also give you [20 more sites in seven core Web areas101](#)

ONLINE



What's New Online

Best of the Best
Join us at www.pcmag.com to take a guided tour of the top 100 Web sites featured in this issue's cover story. Also on the Web: check out the product of the week, the site of the week, and reviews of the latest Internet products in InternetUser (www.internetuser.com).

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INTERNET

Online Content: The Web Delivers

BY DAVID LIDSKY Here's something for the Web user who doesn't have everything—something to push all that Web content onto the user's desktop automatically. Who wants to waste time searching when you can have what you want delivered? Right now it's principally news, sports, and weather that arrive through "channels" you choose.....128



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SOFTWARE

Suite Deals

BY MICHAEL J. MILLER Although Microsoft continues to hold the lion's share of the suite market, Corel and Lotus are not standing still.

We're seeing new combinations of applications, new suites for OSs other than Windows 95, and some pretty aggressive pricing. Here we review the components of the three standard business suites and offer news in other areas145



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TAX-PREPARATION SOFTWARE

Taxation Without Frustration

BY KATHY YAKAL Want lots of help with your taxes for just a little money? Each of the latest tax packages incorporates input from many professionals to make sure you get every deduction and cover all your income bases. These packages are easy to follow, let you spend less time doing your taxes, and even get you started on this year's finances so that you'll be ahead next year281

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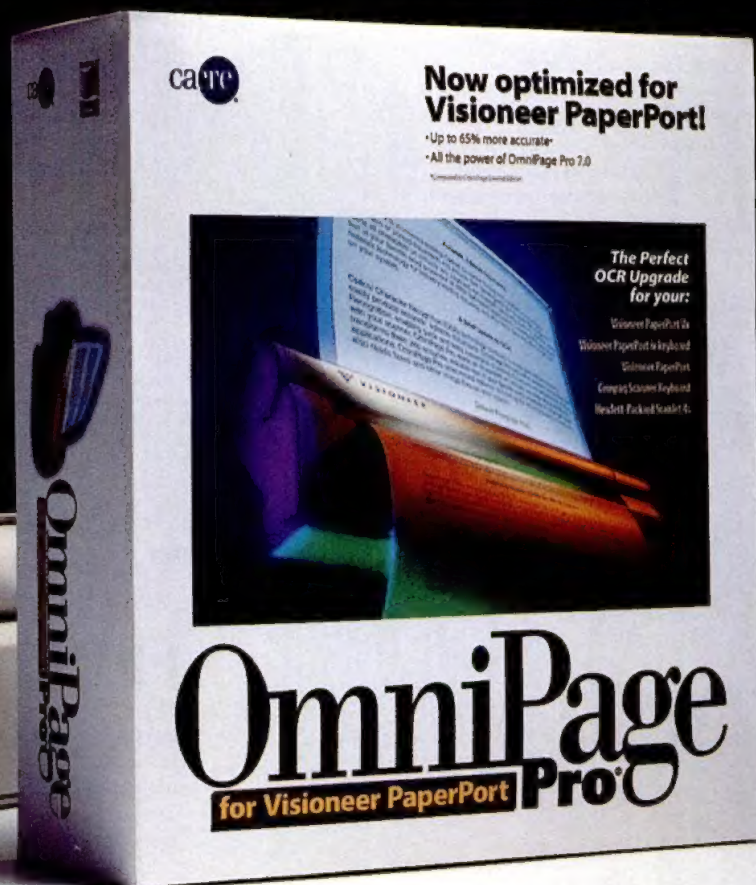
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Pipeline



Webcasting Takes Off

The Web's newest darling—Internet broadcasting, content delivery, Webcasting, call it what you will—is taking shape with help from players big and small. And if the pace of software development keeps up, that could mean no more surfing to Web sites. Instead, Web-based business news, entertainment, sports, weather, and stock quotes—as well as internal company information traveling over corporate intranets—will go straight to your desktop.

A new partnership between Microsoft and Web broadcasting pioneer PointCast is set to shape the technology. In a deal that puts the next version of PointCast Network into Microsoft's June release of Windows, PointCast has the opportunity to increase its 1.7 million subscribership. In turn, Microsoft plans to integrate the 4.0 release of its Internet Explorer Web browser into PointCast Network. The MSNBC television network and Web site will become major content feeds.

The Microsoft/PointCast alliance may be a serious threat to Netscape, whose talks with PointCast last year regarding a similar agreement never materialized. But Netscape is developing its own Internet broadcast technology, Constellation, which will deliver news and software to desktops from a variety of sources such as Marimba.

Bigwigs aren't the only ones betting on this new model; almost half a dozen other developers are poised to get in on the game. IFusion, developer of Arrive—software that fetches Web info on a scheduled basis—launched a beta last year. BackWeb Technologies has announced its personalized broadcasting software along with content produced by General Motors, Infoseek, The Weather Channel, and ZD Net (PC Magazine's online home). And InCommon's Downtown delivers content from CBS Up to the Minute, The Motley Fool, MovieLink, The New York Times, and SportsLine USA, among others.

Online: The Top 100 Web Sites

www.pcmag.com

Once again, PC Magazine's Web experts have set out to find the best Web sites for commerce, computing, entertainment, news, and reference. Take a tour to see what goes into a topflight site and bookmark our list for future reference. Should your site be on our next list? Fill out an online form to let us know about it. Also learn more about the new Web technologies that send information to your desktop automatically. **SUITES RECONSIDERED AND RECONSTRUCTED.** Office suites from Corel, Lotus, and Microsoft are more Internet-ready than ever. Find out how they can help you with the work you do on the Web. **ALSO ON THE WEB.** Check in every day at our NewsWatch page to catch up on the latest Trends and news analysis, read through our daily NewsScan summary of computer coverage from the mainstream press, and examine the ZD Net News Wire feed.

Faster than a Speeding Bullet

In an announcement that could have far-reaching industrial, military, and scientific implications, Intel and the U.S. Department of Energy have produced a parallel supercomputer that has broken the teraflop benchmark barrier of 1 trillion floating-point operations per second.

According to Craig Bennett, an Intel vice president, the supercomputer will be applied to the "Grand Challenges of Science," involving such not-so-everyday topics as applied fluid dynamics, ecosystem simulation, biomedical imaging, and molec-



ular design. Don't try these at home.

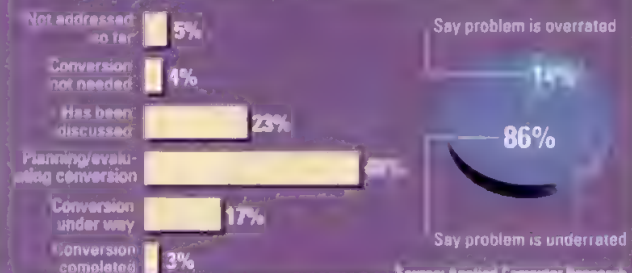
The new supercomputer will have 9,200 Pentium Pro chips and will be capable of billions of calculations in the time a bullet takes to travel a single foot.

Following the news, U.S. vice president Al Gore said, "This milestone in ultracomputing will lead to improvements in weather forecasting, speed drug development, and help identify the genes responsible for illnesses. The new generation of ultracomputers will also replace nuclear explosions with 'virtual' testing."

Don't try that at home either.

Year 2000 Problem Looms

Most companies consider the "year 2000 problem" a very big deal indeed, yet only 24 percent claim to have the situation under control.



Barbie's Business Sense

Looking good, Barbie. The new Barbie Fashion Designer CD-ROM shot to the top of the software best-seller list after its launch last fall, outselling such wildly popular favorites as Flight Simulator and Command & Conquer. Having discovered the buying power of little girls—



and their parents—whom game developers have all but neglected, Mattel Media has also launched Barbie Storymaker and Barbie Print 'n Play.

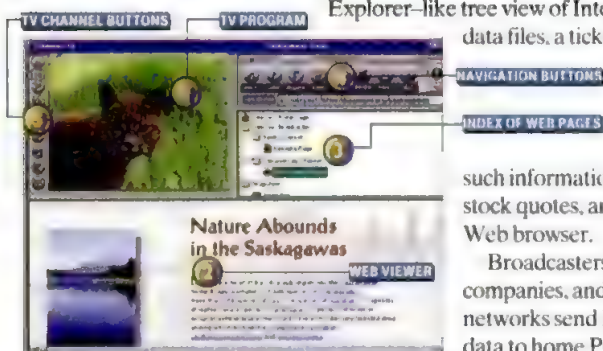
Pipeline

Anything on the PC Tonight?

Intel has its sights set on PC viewing hours with an update to its Intercast software, which delivers TV broadcasts and Web content to PCs. Since introducing Intercast last year, Intel has gathered a growing list of partners and expanded the number of regions in which Intercast service is available.

The Intercast package depends on two components: one that sends content from the broadcaster's end, and Intel's Intercast Viewer software and hardware add-in card at the receiver's end. The Viewer software displays a small window for live TV broadcasts, a Windows

Explorer-like tree view of Intercast data files, a ticker of



embedding data associated with their programming within the Vertical Blanking Interval (VBI) portion of a conventional TV signal. The VBI is the same part of the signal dedicated to closed-caption content.

Intel's Intercast effort is part of a sea change that Intel CEO Andy Grove predicted at Intel's Internet Strategy Day last year. Grove expects average U.S. PC viewing hours to overtake average television viewing hours by the year 2000.

Microsoft, too, is preparing an OS, based on a channel metaphor, to couple TV broadcasts with Web content. But a chance remains that both the Intel and Microsoft efforts to merge Web content with broadcasts may be premature: A recent Dataquest survey revealed that only 4 percent of U.S. households plan to purchase Internet/TV devices—including set-top boxes and PC/TV hybrids—in 1997.

A Less Taxing Season

Each year, the Federal government saves a small fortune in administrative paperwork thanks to taxpayers who file via modems rather than mailboxes. Currently, fewer than 10 percent of tax returns are filed electronically, but that number doubles annually. To encourage electronic filing, Intuit, maker of TurboTax software, lowered its filing fee to \$9.95 this year. Intuit also made the task a little bit

easier by letting filers bypass several extraneous steps when sending in signature files.

TurboTax 1997 will ship with a copy of Netscape Navigator and offer free access to Intuit's Web site via Internet service provider Concentric. There, Intuit's back-end server software will check to make sure you have any updates Intuit may have released since you bought the software. Intuit's 1040EZ form, a Java-based application targeted at college students, is also available for free download.



The Privacy Police

The January launch of eTrust marks one of the most ambitious efforts to protect consumers' privacy on the Internet. Backed by



Data disclosure monitored

CommerceNet, the Electronic Frontier Foundation, and other privacy and electronic commerce concerns, eTrust labels participating Web sites with seals of approval, or "marks."

Participating sites are contractually obligated to follow a stringent set of privacy guidelines set up by eTrust and policed by auditors from Coopers & Lybrand and KPMG Peat Marwick. According to the guidelines, sites must summarize their information-gathering practices and must explain in advance what personally identifiable data they gather,



Private transaction

the purposes for which the information is used, and with whom the information is shared.

Sites must allow users to correct, update, and delete personally identifiable information. Participating sites are also restricted from monitoring personal communications among customers.



Anonymous usage



Where've All the Avatars Gone?

In terms of widespread appeal, 3-D virtual reality has been more virtual than real, but OZ Interactive, a San Francisco-based start-up with roots in high-end animation and graphics programming, is hoping that will change soon.

The company recently made its multiuser OZ Virtual software for creating 3-D environments available as a free download, from www.oz-inc.com. Targeted primarily at entertainment companies such as Walt Disney and MTV, OZ Virtual environments can promote movies, television shows, and shopping, as well as re-create musical performances and videos.

Based on VRML 2.0, a new standard designed for creating dynamic and lifelike 3-D worlds, OZ Virtual supports real-time voice and text chat, 3-D audio, lip sync, and collision detection.

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Source: PC Data. Data for November 1996.



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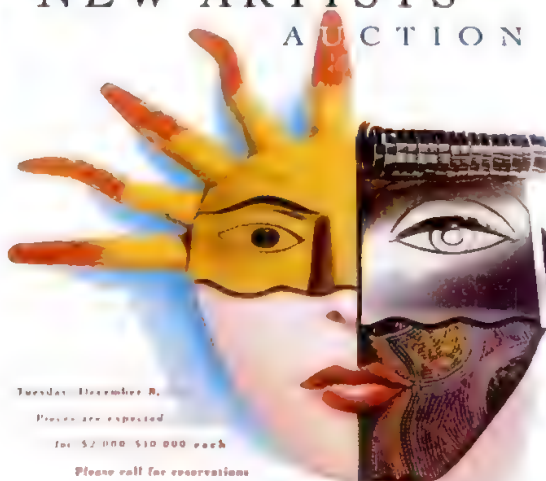
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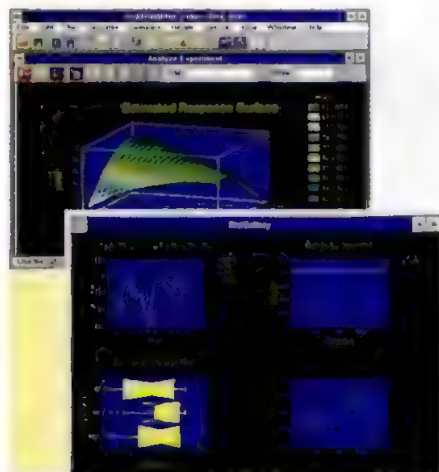


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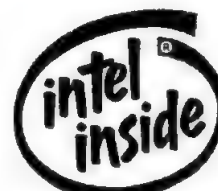
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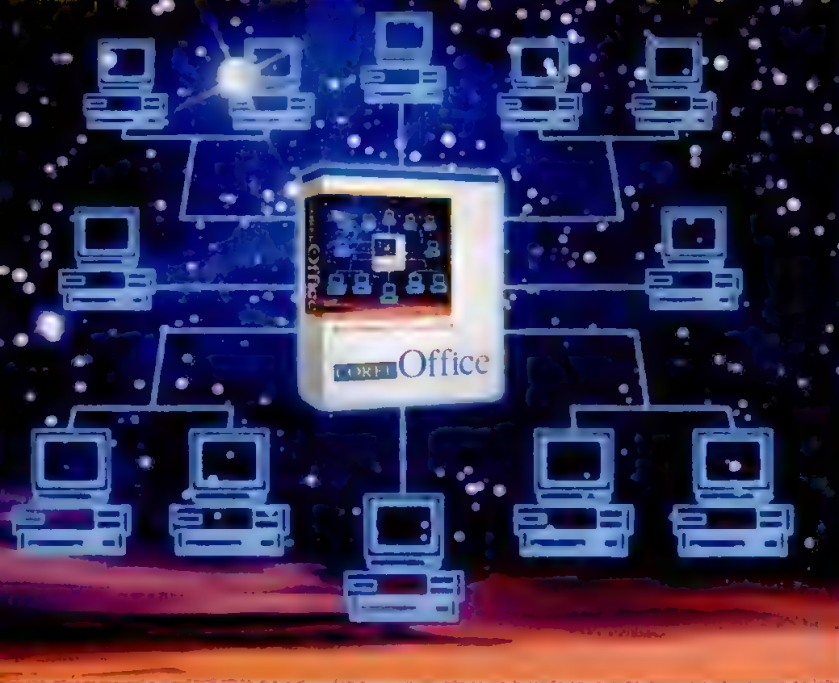
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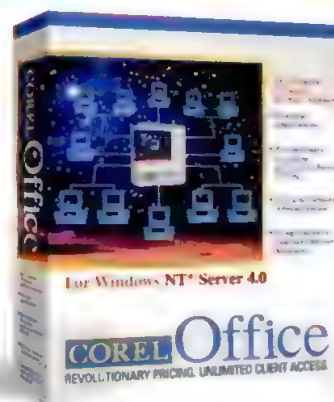
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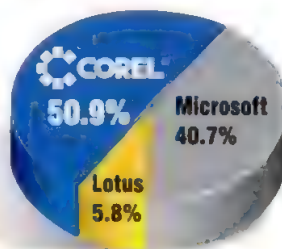
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**Source: PC Week, October 21, 1996, page 128.

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Letters

ALL KEYED UP

With the possible exception of the complaints about "accidental power-on," "higher output resolution," and "lid illogic," John C. Dvorak's column "Top Ten Laptop Laments" (December 3, 1996) tended toward the absurd. His battle cries for an outright prohibition of Caps Lock keys and for a built-in TV tuner for laptops are impractical at best. If he wants to be rid of his Caps Lock key, I would recommend a screwdriver. Leave mine alone. As for the TV tuner, I would like to know what he thinks he would be able to watch in an airplane at 35,000 feet, traveling at 500 mph.

KEVIN MEYERS
via the Internet

Although I agree with almost every item on Dvorak's list, I was taken aback by the comment that no one uses the Caps Lock key on a computer. I use it almost daily for effect in the different documents I create. I agree that this is not the most widely used key on a computer keyboard, but by the same logic, why have two Alt and Ctrl keys?

BILL ESTES
via the Internet

I support a few hundred CAD users, and every time I sit down at one of their systems, the Caps Lock key is on. The reason is that all the text for our drawings is in uppercase letters. It would be extremely inconvenient if there were no Caps Lock key.

ED MOORE
Vancouver, Washington

Dvorak hits the mark with most of his laptop laments, but he misses the target with his recommendation to do away with the Caps Lock key. Who uses it? I use it, and so do most people who create spreadsheets, charts, and business presentations.

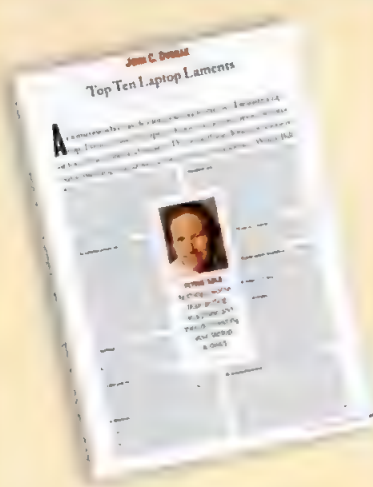
My guess is that the person who set up your magazine with "DECEMBER 3, 1996 PC MAGAZINE" at the bottom of each page may have used it. If Dvorak wants to get rid of useless keys, why not start with Scroll Lock, Pause, Break, or Print Screen?

ERIC MILLER
St. Louis, Missouri

Thank goodness for Dvorak's article. I was certain that the "suspend function" problem resulted from something I wasn't doing right.

GARY STEFFY
via the Internet

When Dvorak states that he would like to see a TV set in a laptop, he has clearly forgotten about electromagnetic interference with air-



*"I was taken aback by the
comment that no one uses the
Caps Lock key."*

craft equipment. The danger of instrumentation failure is very real and might lead to a crash.

SIDNEY SKINNER
via the Internet

I hope Dvorak's recent comments don't get manufacturers to discontinue modems with cable connections. I refuse to buy a modem that has an X-Jack after having three in a row fail within two months.

JON HANSTEIS
via the Internet

I would add just one thing to Dvorak's list: Put a touch screen on laptops. I use one now and love it. I use my mouse more, but the screen makes it so easy to launch programs, and if you're lucky enough to use a program designed for a touch screen, the mouse becomes optional. The laptop computer is a perfect application for this technology.

TOM MUELLER
via the Internet

KEEPING IT REAL

Concerning John C. Dvorak's Inside Track column of December 3, 1996: I disagree. We all benefit from a processor performance rating system. It keeps Cyrix, AMD, and others honest with their claims.

ROY CHARTIER
Ontario, Canada

A NEW DEBATE FOR A NEW YEAR

"Superchips Take Aim at Intel" (Trends, December 3, 1996) seems to imply that one needs a Macintosh with a 533-MHz X⁸⁶ chip

to keep up with the performance of a 200-MHz Pentium Pro. The truth is that a 200-MHz 604e is more than up to the job and that a 225-MHz version is even better. A Mac running the X⁸⁶ should crush a Pentium Pro system running at 200 to 300 MHz.

SRINIVAS RAO
via the Internet

The gist of your article on chip technology is that 1997 promises three processors that will be faster than current Intel Pentium Pro CPUs. What it fails to mention is that Macs shipping with PowerPC 604 and 604e processors already outperform the Pentium Pro.

CHRISTOPHER WILSON
via the Internet

SCIENTIFIC ENDEAVORS

After reading your reviews of Pentium- and Pentium Pro-based PCs ("Choose Your 200," December 3, 1996), I wanted to express a long-standing gripe I've had regarding the benchmark tests. It's impossible for me to tell how a machine will perform in scientific applications that require large amounts of memory and perform floating-point operations. *PC Magazine's* orientation toward business users is understandable, but whether a word processor program takes 5 or 10 seconds to load really isn't very significant. More relevant to me is whether running a computation takes 2 hours or an hour and a half.

TIMOTHY R. GOSPEL
via the Internet

TO THE MOON

I enjoyed reading the reviews of graphics accelerators in "3-D for Free" (December 3, 1996). I plan to buy a new 3-D accelerator in the near future, and I have one complaint about the article. As a former Diamond Stealth 32 owner and the proud owner of a 2MB STB Velocity 64 VRAM board, I was disappointed and curious as to why you didn't test the new 4MB Velocity 64 3D with VRAM and the Diamond Stealth 3000 series.

KEVIN MCMILLAN
via the Internet

Neither card was available for testing.—Ed.

In reviewing 3-D accelerators, why didn't you present any performance results for your 3-D tests? The cards' big selling point is 3-D, isn't it? I'm not sure why you concluded that the 2-D performance information was sufficient. How can I make an objective decision about these cards when I don't have any quantitative data on their 3-D capabilities?

MARK EDWARDS
via the Internet



The **LINE** **SPEED** lie

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Letters

As an Imagine 128 Series 2 user, I think *PC Magazine* should have mentioned that the 2e card has only DRAM and that the VRAM version, though much more expensive, supports higher color depths.

NATE APHRO
via the Internet

VRAM is not faster than DRAM, nor are any of the other memory types. Most operate at around 50 to 60 nanoseconds these days, though some types of RAM can improve certain, but not all, operations. VRAM, a dual-ported memory, is used on a board that's designed to achieve high refresh rates. DRAM, on the other hand, must take care of the refresh out of the same port that is used to read data from the graphics controller. Color depth directly correlates with the amount of memory on the board. Here, VRAM and DRAM are the same.—Ed.

TROUBLE IN THE FAST LANE

I was shocked to see the U.S. Robotics Sportster 33.6 Faxmodem named the Editors' Choice in "Data in the Fast Lane" (First Looks, December 3, 1996), particularly after the Sportster performed so poorly on one of only three tests. Compatibility has long been a problem for U.S. Robotics products, as the test found.

JOHN W. MOREN
via the Internet

NOTING THE DIFFERENCES

"A Look Inside Bitmap Files" (Tutor, December 3, 1996), which explains the differences between image formats, is informative. But you fail to mention that the formats have

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CORRECTIONS AND AMPLIFICATIONS

In the December 3, 1996, Trends article "Superchips Take Aim at Intel" (page 30), we incorrectly stated the amount of internal cache on the AMD K6 processor. The correct amount is 64K.

We incorrectly stated why we excluded the AST Advantage! from our story "High Style, High Speed" (December 17, 1996, page 150). The reason was that our test-bed filter required 16MB of RAM in each machine; AST sells its home PCs with a minimum of 24MB, disqualifying the Advantage! from our roundup.

The list of bundled software for the Toshiba Infinia 7200 in the same story should not have included Microsoft Office.

In "The 13th Annual Awards for Technical Excellence" (December 17, 1996), we should have included Steve Brehaut in the development team for the Toshiba Infinia.

different roles: JPEG and .GIF files were developed for the Web and have little usefulness for print because of their low image quality, whereas TIFF files have a much higher image quality and have always been intended for print.

BENJAMIN RUCKER
via the Internet

A LASTING IMPACT

I understand from the November 19, 1996, Trends article "Modem Makeovers" that new chips and software-only designs will lower modem prices and transfer a lot of the work from the modem to the system's processor. What the article doesn't discuss is the resulting impact on the processor—and on overall system performance.

DEBRA JONES
via the Internet

UNSATISFIED CUSTOMERS

There is a serious defect in CompuServe 3.0.1 under Windows 95: The program will not disconnect if it thinks other programs that access it (such as Norton Taskbar or Microsoft Office Shortcut Bar) are running. Only by going to the CS3 Connection in the Taskbar can you manually disconnect, and if you fail to do this, you can be connected indefinitely and not know it. I confirmed this bug with CompuServe, but the company had no solution. This is such a serious defect (especially if my children are running the program) that I canceled my CompuServe account and joined America Online.

GERALD S. WEINSTEIN
Pittsburgh, Pennsylvania

CS3 is the most frustrating and disappointing program I have ever used in my 20-plus years of computing. To get an idea of how many people are frustrated, spend some time reading the countless messages on CompuServe's Help Forum. There were so many messages here after the release of CS3 that the response time had grown to several days. The number-one complaint is that CS3 is significantly slower than Version 2.0.1. On my Pentium 90 I tested both programs: 2.0.1 con-

nected and was ready in about 20 seconds, while CS3 took 2 minutes. CompuServe has been very reluctant even to admit when a bug is identified, and it provides no idea of whether or when such bugs will be fixed in a maintenance release.

JIM FEDERLEIN
via the Internet

NOT SO "SUITE"

The article "Application Integration" ("Suite Peeks," November 19, 1996), defines a suite as "a common user interface and consistent approaches to universal tasks. . . ." I disagree. That merely describes a "package" of applications thrown together so the vendor can sell you more than you need. Besides, those characteristics should be normal by-products of different applications from the same vendor, shouldn't they?

The article goes on to say, "If a suite shares code among its applications, so much the better. . . ." In my opinion, this is what defines a suite. Why should I have three different spell-checkers (along with huge separate dictionaries) for a word processor, a spreadsheet, and a presentation application? Before I anoint these "packages" with the term *suites*, they had better become much "suiter."

NORMAN MARTENS
via the internet

WATCH WHERE YOU AIM THAT GUN

Concerning Jake Kirchner's column "You Don't Bring a Knife to a Gunfight" (Pipeline, November 19, 1996), I think one response to his statement that "it's hard to see where the real competition against Microsoft will come from" is that the attack will come from within. To see what I mean, browse Microsoft's Web site for a while using Internet Explorer. It won't take too long before you encounter an area that is "only accessible with Netscape Navigator." It looks to me as if the competition doesn't need a knife or a gun. Big M seems to be pretty good at shooting itself in the foot.

BRAD HANSCOM
Florence, Oregon

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–PC Magazine, March 26, 1996

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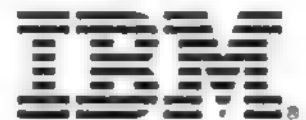
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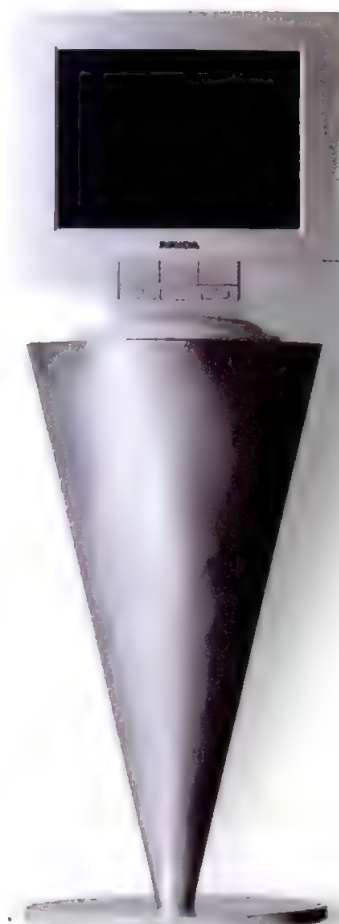
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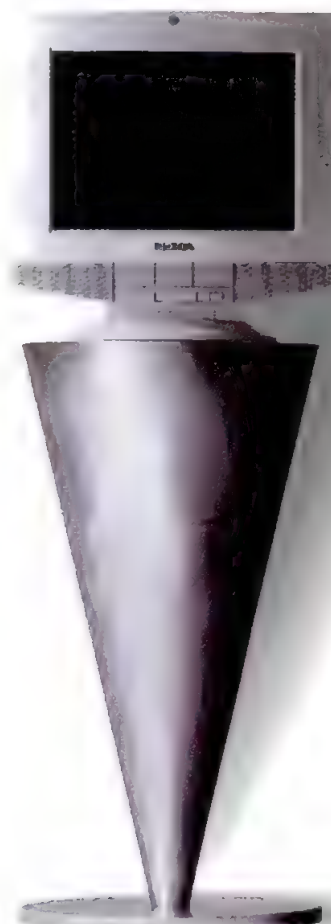
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emissions. This reaffirms Nokia's leadership in the science it pioneered.

The media-ready series does more than extend Nokia's most award-winning model (7 industry "Bests" so far). It literally shouts innovation. Dual powered stereo speakers in front combine with a subwoofer in the swivel/tilt base to shape audio at the intimate volumes most suitable for working close to a monitor.



447Xavc—Adds to X series features with built-in color video camera

This gives you the kind of audio system that multimedia and communications applications require, without a nest of wires and speakers fighting for the precious real estate around your computer.

The audio capabilities of the media-ready series extend to the built-in microphone set in the top of the bezel (at ideal voice height). This feature completes the requisites for computer telephony. The 447Xavc model even houses the world's first inboard color video camera for video-capture and conferencing. Truly, the media-ready series enables the complete convergence of computing and communications.

Of course, each of these systems comes with full digital controls and on-screen menu-driven adjustments (which Nokia also pioneered). Yet their pricing is remarkably competitive. All of which makes the new 447X series a necessity for anyone making full use of their computer. After all, the best way to meet the standards is to work with the people who set them.

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Trends



Beware the Backlash

Is the Web risky business?

Researchers are constantly poking and prodding the Internet to monitor its vital signs, and they've uncovered quite a bit of information about who's there, what they're doing, and why they're not there more often. One of the latest studies found that the stream of people trying out the Internet for the first time is slowing. Combined with a decline in first-time buyers of home PCs, could this trend point to the onset of what IBM CEO Louis Gerstner recently called "Web weariness"?

According to a survey conducted by the Georgia Institute of Technology, the percentage of users new to the Web has fallen significantly, with 36 percent of respondents saying they had been online for less than a year, compared with 60 percent in the survey conducted a year ago. "It's my belief that we have reached saturation in the initial phase of Web growth as the rate of introducing new users has slowed and the existing user base has matured," explains Georgia Tech researcher James Pitkow.

Future growth, he says, depends on the adoption of simple-to-use devices for getting onto the Web, such as WebTVs and Internet phones. Additional growth will also depend on upgrading the telecommunications infrastructure as well as providing people with better assurances of online security and privacy.

For every optimistic projection you read about the Web, you can find an equally pessimistic view. First, the good news: In 1996, the Internet created 1.1 million jobs worldwide. The Global Internet Project—a new coalition of 16 software and telecommunications companies that plans to help shape policies concerning Internet security and privacy—even claims that

the Internet has been responsible for \$200 billion in market capitalization and had accounted for the entire economic growth of the U.S. in 1996. According to research firm Killen & Associates, consumer transactions on the Internet will reach \$300 billion by the end of the decade.

The Internet's underbelly is fueling equally compelling predictions. The Federal Trade Commission has warned some 500 Web sites about operating potentially illegal pyramid schemes, and it has filed 15 lawsuits alleging on-line scams. Nearly 40 state attorneys general are working with the Food and Drug Administration to evaluate the policing of fraudulent medical claims on the Internet. And FBI director Louis Freeh has said that economic espionage using electronic networks costs U.S. businesses \$100 billion per year.

According to the Georgia Tech survey (which questioned some 15,000 Web users), distrust of Web sites has led many to avoid sites that require registration. A third said they provide false information when encountering such sites. Recently, Netcraft and O'Reilly & Associates surveyed over half a million Web sites. They concluded that fewer than 1 percent of those sites are in a position to conduct secure transactions with both encryption and authentication.

BUILDING TRUST

Yet from this bleak scenario emerges an upbeat future. As society embraces the Internet as an essential medium for public and private communications, the Internet will be used in-

creasingly to distribute medical records, financial information, contracts, and confidential technical data.

"More than any other single factor, the potential for e-commerce hinges on customers' confidence that the network can keep private records private," says IBM's Gerstner. In this regard, Pretty Good Privacy recently introduced PGPcookie.cutter, a browser plug-in that provides private and anonymous Web browsing by selectively blocking Web "cookies"—data files created by Web servers and stored on users' computers to record the trail of visited Web sites, online purchases, and private information. While cookies can be useful in saving your password for a particular site, they can also constitute an invasion of privacy, according to PGP. In addition, ZD Net (owned by the

parent company of *PC Magazine*) recently launched a similar utility called CookieMaster.

Meanwhile, U.S. law restricts the export of encryption software, but the tide may be turning to more-unfettered use. "You're seeing the last dying gasp of the Cold War—era guardians trying to hold back the new generation from deriv-

ing benefit from the technology," says Marc Rotenberg, director of the Electronic Privacy Information Center in Washington, D.C. A San Francisco court recently ruled in favor of overturning export restrictions on cryptography.

Yet the real driving factor behind the deployment of encryption is going to be electronic commerce, according to Tim Mather, information systems security manager at Apple Computer. Eventually, he predicts, encryption and decryption will be an integral part of the network without users even knowing about it. Now that's a prediction everyone can live with.—Carol Levin

Future growth of the Web hinges on better assurances of online security and privacy.

Apple's NeXT OS

Steve Jobs makes an Apple comeback.

Steve Jobs has grabbed headlines by convincing Apple Computer to buy his company, NeXT Software, but what impact will the deal have on Apple's products? Apple had been in talks with Menlo Park, California-based Be Inc. to buy Be's operating system, but the deal fizzled. Instead, Apple will buy NeXT Software and its operating system for \$400 million. A marriage between NeXT's object-oriented operating-system software and Apple's system software will take place this year. But can it compete?

The fact that there are applications for the NextStep operating system—albeit only a few—is a key advantage NeXT has over Be. Also, NextStep can run applications for the Macintosh operating system via emulation software called Executor. Executor, which comes from the New Mexico-based ARDI Corp., emulates only the System 6 Macintosh OS, but Apple may extend it.

The large supply of Microsoft Windows applications gives the Windows platform an advantage over an Apple/NeXT hybrid OS. Emulation software for running Windows applications on non-Windows systems is available from Insignia Solutions. But as with Executor, applications run slower in SoftWindows than they would in their native environments.

Attracting applications developers will be a key goal for Apple. NextStep is an object-



AMELIO'S GOAL: Apple's CEO wants to position an Apple/NeXT OS as the company's high-end software bet.



CONSULTANT: Only months after calling Microsoft the victor in the OS wars, Jobs has agreed to help Apple.



oriented OS that, like Windows NT, offers sophisticated memory and crash protection. NextStep supports multiprocessing, but its code needs improvement to run faster on machines with multiple processors—a strength of Windows NT. The NeXT OS can read, format, and write to disks for Macintoshes as well as PCs.

Steve Jobs, who will work with Apple as a consultant, has done pioneering work in bringing object-oriented technology (based on NeXT's WebObjects software) to the Web. One of his main functions may be to make the new operating system Web-smart.

Stay tuned to the *PC Magazine* Web site for news about Apple's new operating system. —Sebastian Rupley



Suite Bugs Up Close



PROGRAMS MAY RUN, BUT THEY CAN'T HIDE from BoundsChecker. Mostly as an amusing afterthought to our testing of office suites

(see the feature story "Suite Deals"), we decided to analyze Corel Office 7 and Microsoft Office 97 with NuMega Technologies' bug detector BoundsChecker, winner of a *PC Magazine* Editors' Choice as well as a Technical Excellence award. (Since Lotus SmartSuite 97 was still in late beta during testing, we thought it would be unfair to include it in this analysis.)

Any large software package has its share of bugs, but some are more significant than others. A bug in a word processor's functional logic, for example, may result simply in incorrectly spaced characters or footnotes that are out of synch with the rest of the document. Then there are the misuses of system features, such as the passing of bad parameters to API calls or the failure to release allocated memory. We found that BoundsChecker excels in detecting this latter category of bugs.



FAIR AND SQUARE

In all fairness to Corel and Microsoft developers, BoundsChecker didn't find anything too bad. Many of the bugs we found may not have been mistakes at all but rather intentional programming techniques. For instance, a master block, which an application uses to suballocate memory, often masquerades as a memory leak. Allowing other bugs that result in an application's failure to release some resources or close Registry keys is not a good practice, but they usually cause no harm.

The suites did have their share of problematic bugs, though. For example, we noticed instances when Microsoft Word for Windows used movable memory without first locking it; in the worst case, this could freeze the system. We also found programs that could not properly close threads (a series of operations that execute outside of the main program

sequence), because the applications failed to close resources that belonged to those threads. Further testing uncovered suspicious API parameters, such as WordPerfect's use of a Null window handle in a call to close a window, a call known as DestroyWindow. Null is a value usually reserved for error conditions and not a valid window handle.

Some of the minor bugs, such as resource leaks, can evolve into major problems if they occur often enough. For instance, when you quit a program, Win 95 releases all of the memory and resources that the application failed to release while it was running. But if you stay in one program all day, such a recurring memory or resource leak can cause a system failure.

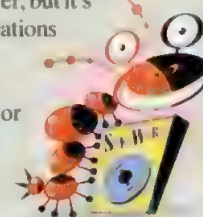
The current version of Microsoft Internet Explorer, for example, leaks Windows GDI fonts and regions until you either quit the program or the system runs out of GDI resources. This is one reason why quitting and then restarting an application can often solve problems. In addition, API calls with bad parameters can cause Windows to invoke exception-handling routines, which slow the system if they happen frequently enough.



BOTHERSOME BUT NOT HARMFUL

While it's reasonable to be bothered by some of the errors we found, it's not fair to conclude that the programs we examined are especially buggy. On the other hand, these are important products from first-tier companies, and one should perhaps expect a higher level of quality from them. In the end, BoundsChecker may be occasionally worthwhile as a PC Labs tool for finding error conditions such as the GDI resource problem in Internet Explorer, but it's a better idea for applications developers to use it.

You can reach NuMega at 800-468-6342 or at www.numega.com. —Ben Z. Gottesman and Larry Seltzer



Digital Watermarks

Copyright protection for online artists.

Oddly enough, someone who wouldn't dream of plagiarizing an author's words is often untroubled by appropriating an artist's image. The use of a picture without its creator's or copyright owner's permission is especially prevalent when the image is distributed electronically—either by CD-ROM or through the Internet—because a digital copy doesn't suffer the same degradation as a photographic copy. Standard protection schemes (such as locking files, encrypting data, distributing low-resolution previews, and marking images to make them unusable) inconvenience both the artists and their potential customers.

Now a new technology, PictureMarc, from Portland, Oregon-based Digimarc Corp., offers a viable alternative. PictureMarc inserts a digital watermark into any computer-generated or scanned image. Unlike other electronic watermarking technologies, which deface pic-

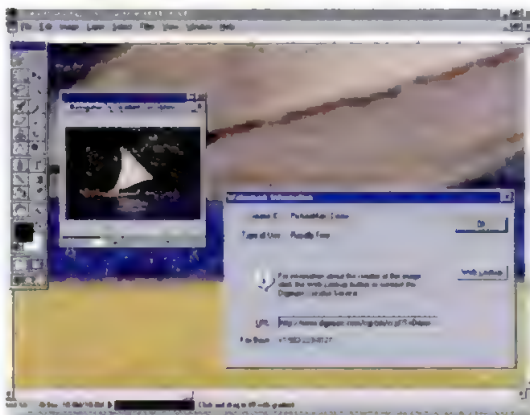
tures, it doesn't noticeably affect images, allowing the distribution of high-quality pictures.

PictureMarc's digital code, which hides within the random variation normally found in a scanned picture, is smart enough to vary its in-

it consists of a subtle noise pattern generated in the luminance channel of a color image, Digimarc says the watermark is detectable even when the image has been cropped, color-corrected, or otherwise edited. Graphics programs that use PictureMarc (Adobe Photoshop 4.0, Corel PhotoPaint 7, and CorelDRAW 7) can both embed and detect digital watermarks.

The watermark identifies the author, the copyright owner, and even the specific permissions. Although it won't prevent people from deliberately using a picture illegally, it will prevent them from doing so innocently. Whenever a watermarked picture is opened, PictureMarc alerts the viewer to its copyright status and displays a Web address and phone number for Digimarc's Internet- and fax-based referral services. With a click of the mouse or a call on the telephone, a potential customer can learn relevant information about the artist.

This technology should also prove invaluable for artists seeking to prove that copyright infringement has occurred.—Luisa Simone



DIGITAL ID: PictureMarc embeds a watermark by generating a subtle noise pattern (visible in background closeup) without defacing the image.

tensity automatically to remain invisible in both solid expanses of color (such as the sky) and highly detailed areas (such as a face). Because

JAKE KIRCHNER

Desperate Times, Desperate Measures

It will be remembered as a research center that couldn't bring its best technology to market. Despite its large staff of brilliant technicians who developed one amazing breakthrough after another, in the end it was outsiders who capitalized on the technology and built microcomputer empires.

Of course, today I'm talking not about Xerox's Palo Alto Research Center (PARC) but about Apple Computer. With the announcement of Apple's planned acquisition of NeXT Software, Apple executives all but acknowledged that the company wasn't capable of developing its next-generation operating system. Knowing Apple spent four years and perhaps as much as half a billion dollars working on System 8 (known as Copland) with little to show for it, it's hard to argue with the company's conclusion.

That failure, coupled with Apple's struggle over the last year to upgrade its desktop and laptop hardware and hold onto its market share, made many people wonder if Apple had a sustainable business model. CEO Gilbert Amelio and chief technology officer Ellen Hancock evidently concluded the company did not. By cutting expenditures and reducing the size of the company, Amelio had succeeded in stemming Apple's losses. But it wasn't clear what else he could do to save the company if Apple couldn't get beyond the consistent promise to field great new products—next year.

After unsuccessful negotiations to acquire Be Inc. and its operating system, Amelio turned to Steve Jobs and NeXT, quickly closing the deal for \$400 million.



This is a very nice deal for Jobs, but it's hard to tell at such an early stage how good it will be for Apple. In the stack of press releases announcing the acquisition, Amelio and Jobs described the "complementary" nature of the two companies. But their best explanation of that synergy was that Apple needed an operating system for its large installed base while NeXT needed to sell to an installed base. This sounds more like mutual desperation than complementary businesses.

Left unexplained so far is what NeXT will have to do to graft its software onto the Macintosh platform. It no doubt can be done, but Amelio's and Hancock's assurances that it will take place by late 1997 are not all that comforting to those who have large amounts of money invested in Mac hardware and software.

This desperate act is surely a blow to Apple's engineers, who have struggled to overcome years of unfocused top management and bumbling marketing efforts. But the truth is that Apple had to be saved from itself. Over the last few years, it has come to exist almost solely to serve a few niche markets, particularly graphic arts and publishing. Even there, it owes its success more to the software produced by Adobe and Quark than to its own hardware and software development.

The best that can be said for the NeXT deal is that it serves as a stay of execution for Apple, giving the company's employees, stockholders, and customers some small bit of hope for the company's future. That's not much to recommend the merger, but desperate times call for desperate measures.

Monkey on your back #28: How to turn your PCs into real Windows NT[®] clients without really turning your PC users off.



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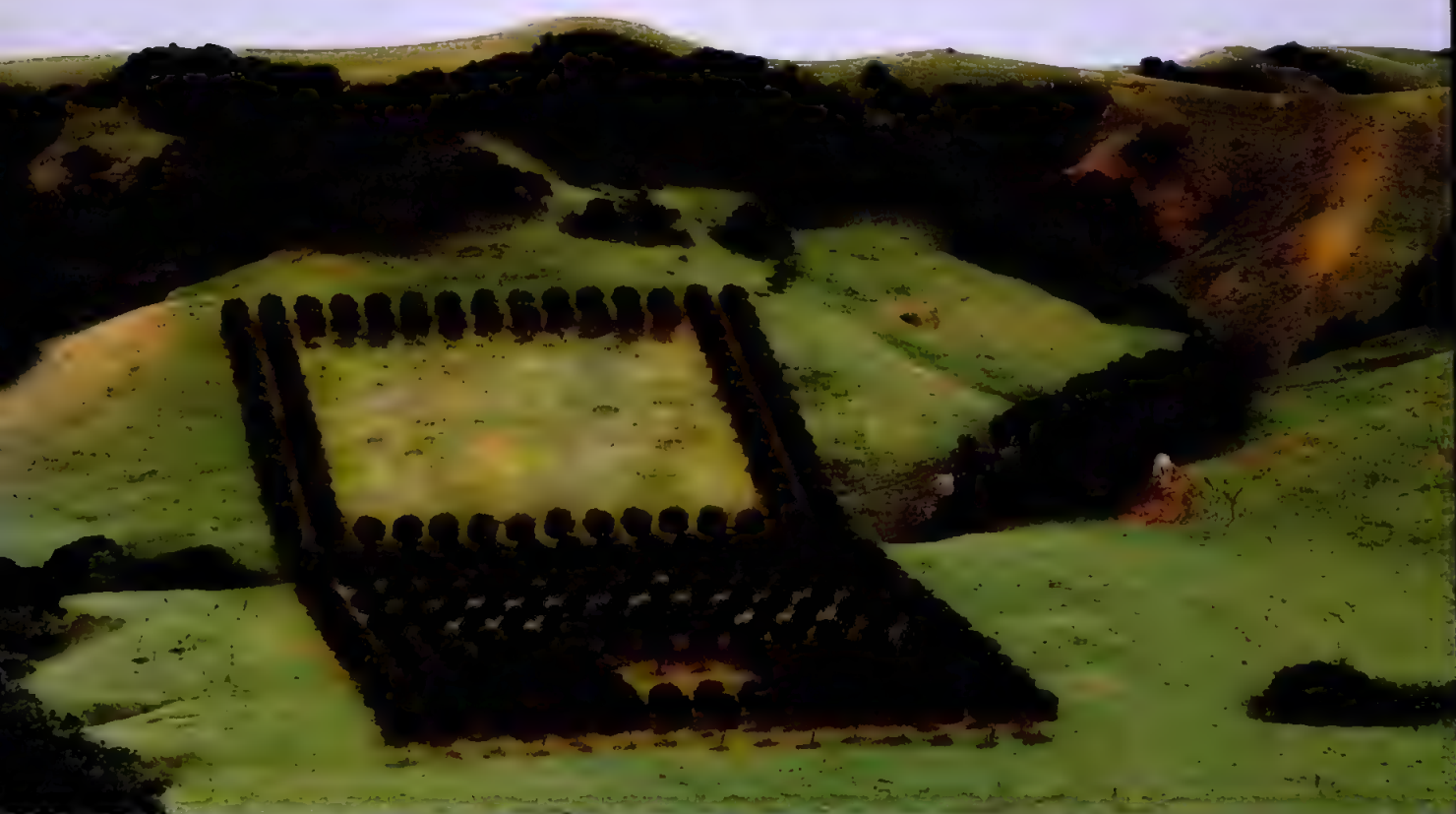
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NOTEBOOK PCs

Mobile, MMX Multimedia

This January, Intel introduced both desktop and mobile versions of its latest chip, the Pentium Processor with MMX Technology. In last issue's cover story ("MMX Extends the Desktop," February 5, 1997), we reviewed the first wave of MMX desktop PCs. And this issue's First Looks section examines the first of the MMX notebook PCs; in addition to the four notebooks we review there, three MMX portables—from IBM, NEC, and WinBook—are on the horizon.

IBM Corp. (800-772-2227, www.pc.ibm.com) has now added an MMX processor to its ThinkPad 760, one of the industry's leading notebook designs. The 166-MHz **ThinkPad 760XD**—which will carry a price tag of roughly \$6,500—is rather cumbersome at 8.1 pounds, but it is brimming with high-end features. It has a 12.1-inch active-matrix

feature that you can only find in ThinkPads), a MIDI game port, and MPEG-II support.

With its fantastic sound system and set of integrated stereo speakers, the ThinkPad 760XD is certainly well equipped for running fledgling MMX audio applications. With this latest ThinkPad, IBM has improved the sound circuitry and is using a new speaker manufacturer, so the machine's audio is better than ever. In case you want to access audio applications on the Web, the system even offers an IBM Media Processor that doubles as a 28.8/14.4-Kbps telephony modem.

IBM rounds out this configuration with a PC Card bay (two Type II or one Type III), a lithium ion battery, and

a rear infrared port. The company also bundles several software titles (including Net-Finity and Trans-Xit2, as well as an MMX-optimized applica-

NO VICE VERSA: NEC's Versa 6050MX couples a 10X CD-ROM drive with a 33.6-Kbps modem.

XGA display, a new 3GB hard disk from IBM, 256K of L2 cache, 32MB of RAM, and a 64-bit Trident 9385 chip set with 2MB of VRAM.

The system's ebony-colored chassis houses a standard 8X CD-ROM drive but lacks an integrated floppy disk drive. If you want to use floppy disks, you have to connect to an external drive via a serial port. As always, the full-size keyboard tilts up when you open the unit, though you can easily return it to a collapsed position. Multimedia users can also take advantage of NTSC video-in and video-out ports (the former is a

tion, The Ultimate Human Body 2.0) and provides a 3-year parts-and-labor warranty.

Also from IBM is the **ThinkPad 760XL**. This 166-MHz MMX notebook uses the same general design as the 760XD but settles for an SVGA screen, 16MB of RAM, a 2.1GB hard disk, 1MB of VRAM, and MPEG1 video support; the CD-ROM drive is optional. Both machines target mobile presenters and the corporate customer looking for a desktop replacement.

Another vendor to join the ranks of those shipping MMX-

powered notebooks is NEC, with its \$5,199 **NEC Versa 6050MX**. The Versa's gray chassis houses a 150-MHz MMX Pentium processor, 16MB of memory (expandable to 80MB), a 2.1GB removable hard disk, and 256K of L2 cache. Two stereo speakers reside below a 12.1-inch XGA active-matrix display.

A front modular bay—dubbed



SOUND SYSTEM The IBM ThinkPad 760XD offers fantastic audio and an XGA display.

added Zoomed Video support and a new version of the NeoMagic card (model 2093). The price tag for the system is in the \$4,000-to-\$5,000 neighborhood.

Just after the release of the LM MMX system, WinBook plans to ship an **MMX version of its FX notebook**. For the most part, this 166-MHz high-end portable has the same general configuration as its sister machine. It does not, however, offer wavetable synthesis, Zoomed Video support, a NeoMagic graphics chip set, or an internal CD-ROM. The modular 8X CD-ROM can easily be replaced with a floppy disk drive or a second battery. The FX also has a Windows 95 keyboard with full-size, 19.5-mm keys.

WinBook will sell the FX MMX unit for roughly the same price as the LM MMX portable. The biggest difference lies in the distribution: While the LM MMX is sold only at CompUSA retail stores, the FX is available directly and through various other superstores.

Other vendors have plans for MMX mobile offerings. This spring, Dell Computer Corp. plans to incorporate the MMX Pentium into its Latitude line of notebooks, while Hewlett-Packard Co. will introduce an MMX line of OmniBooks. MMX notebooks are also due from AST and IPC Technologies.—*Mary Behr and Cade Metz*

the VersaBay II—can accommodate a standard floppy disk drive, a 10X CD-ROM drive, or an optional second hard disk or battery. Both batteries use lithium ion technology.

NEC has also equipped the Versa with an integrated 33.6-Kbps modem, Zoomed Port Video support, 32-bit Card Bus support, and dual fast-infrared ports (one in the front, one in the rear). Less conspicuous components include a PC Card bay for using two Type II cards or one Type III card, and an external volume-control thumbwheel. The Versa is backed by a 3-year warranty that includes a year of onsite service.

WinBook Corp. (800-468-2162, www.winbookcorp.com) will soon ship the **WinBook LM MMX**—a 166-MHz portable with an integrated CD-ROM drive. The original \$3,799 standard WinBook LM shipped in November with NeoMagic's 128-bit graphics accelerator, a 12.1-inch SVGA active-matrix display, 256K of L2 cache, a lithium ion battery, and a 115.2-Kbps IrDA infrared port. The imminent up-

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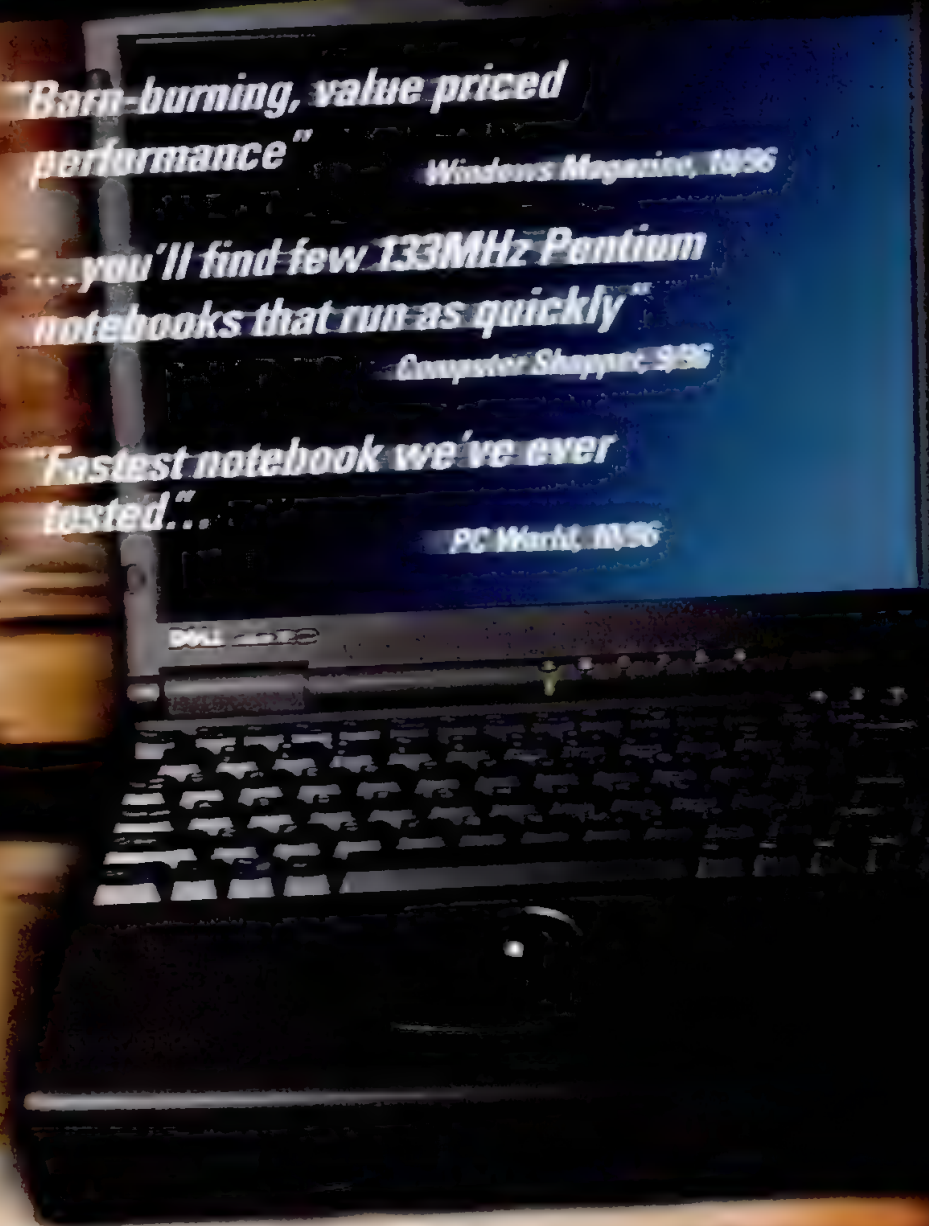
Windows Magazine, 10/96

"...you'll find few 133MHz Pentium notebooks that run as quickly"

Computer Shopper, 9/96

"Fastest notebook we've ever tested..."

PC World, 11/96



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- PCI Bus with 128-bit Graphics Accelerator
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- Smart Lithium Ion Battery
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- PCI Bus with 128-bit Graphics Accelerator
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- Integrated 16-bit Stereo Sound
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SYSTEM NOT PICTURED

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GREETING CARD SOFTWARE

Cards Galore—and More

Have you ever spent an inordinate amount of time staring at seemingly endless rows of cards in search of the perfect greeting for that special someone, that certain occasion, or that all-too-swiftly approaching holiday? Well, now you don't have to feel frustrated when you can't find a perfect fit. You can easily make your own card with some very handy greeting card software.

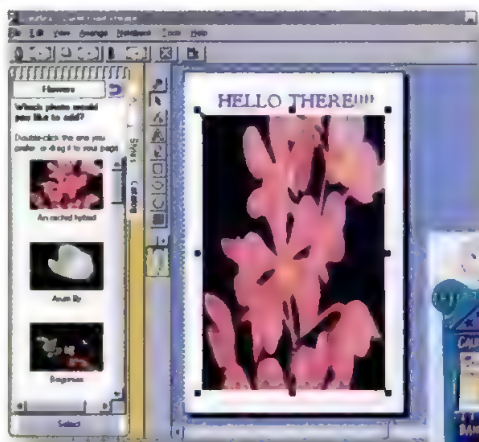
For instance, Micrografx (800-676-3110, www.micrografx.com) has teamed up with the card maker, American Greeting Corp., to offer **CreatoCard Plus**. This \$29.95 product comes with over 3,000 cards, 1,000 pieces of clip art, 50 fonts, and 3,000 verses straight from those inspired American Greeting professionals.

CreatoCard Plus, which runs on Windows 3.1 or Windows 95, helps you make not only cards but also signs, certificates, and other kinds of announcements. The program includes a system for reminding you of important dates, an address book, the ability to print on envelopes, and a personal card-delivery service; Micrografx posts updates on its Web site.

Another product from Micrografx, the \$49.95 **Windows Draw 5.0**, serves as a graphics- and print-studio package for Windows 95. You can create banners, signs, posters, business cards, labels, brochures, diagrams, certificates, and calendars, not to mention greeting

cards. And you'll find over 20,000 clip-art and photo images as well as 250 typefaces.

Also entering the fray is Microsoft Corp. (800-426-9400, www.microsoft.com), which has paired up with Hallmark Cards to produce **Microsoft Greetings Workshop**, also \$29.95. Microsoft



has packed this Windows 95 package with more than 4,000 graphic images, 200 photos, 100 fonts, and 2,000 customizable greetings.

Besides greeting cards, Microsoft Greetings Workshop lets you create calendars, banners, newsletters, coupons, and more. An Ideas feature helps get your innovative juices flowing, offering suggestions for any occasion you wish to celebrate or highlight. The program also reminds you of such occasions and comes with specially designed paper from Hallmark: seven card-stock sheets in a variety of colors.

In addition, the product's Greetings Workshop Internet Delivery lets you send your creations to friends and family across the Internet. The companion application also lets you create a

mini-Web site on your hard disk, and if you have access to an Internet server, you can set the project up as a World Wide Web site. Microsoft's Web site offers an updated selection of cards.

Although lacking a partnership with a greeting card manufacturer, Sierra Online (800-757-7707, www.sierra.com) has put together a well-rounded tool in the \$59.95 **Print Artist 4.0**. Sierra

IT'S ALL IN THE CARDS: Examples of greeting cards you can make with software from Corel (left), Microsoft (below), and Sierra Online (right).



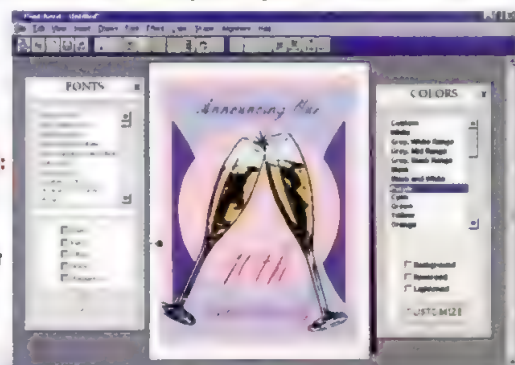
has packed Print Artist with about 9,000 graphic images, 600 photos, and 300 fonts. The 1,500 layouts let you create not only cards but signs, business cards, letterhead stationery, certificates, labels, banners, calendars, and crafts (such as gift boxes, party hats, board games, and place mats).

Print Artist, which runs on Windows 3.1 or Windows 95, also comes with a phrase database that includes 1,000 quotes and such special effects as zooms and shadows.

Longtime graphics software maker Corel Corp. (800-772-6735, www.corel.com) offers the \$69 **Corel Print & Photo House**, which give you extensive tools for making greeting cards, business forms, banners, certificates, and more. This package combines Corel's

Print House and Photo House to offer over 7,000 clip-art images, 1,600 ready-to-print samples, 1,000 photos, 1,000 phrases, 200 backdrops, 150 fonts, and 70 borders that fit to the page.

The 32-bit package presents a host of new features in Print House, among them a fit-text-to-path option, rainbow fills,

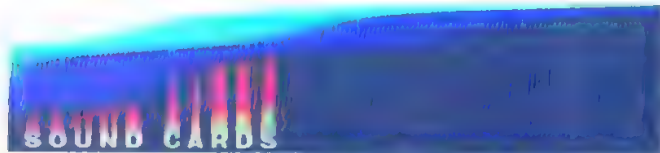


and easy object alignment and distribution. And with Photo House's tools—including drag-and-drop touch-up, red-eye removal, color replacement, and such playful effects as page curl and a psychedelic look—you're well equipped for incorporating your favorite photos into your personalized creations.

Corel will provide updates to the software via its Web site.

Looking for a less conventional greeting card? Connectix Corp.'s \$30 **Connectix QuickCards, Version 2.0** (800-950-5880, www.connectix.com) takes a multimedia-centric approach to personalized greeting cards. Although seamlessly integrated with Connectix's QuickCam black-and-white (\$99) and color (\$199) digital video cameras, the software can be used with any image input device. QuickCards offers over 120 multimedia greetings from which you can choose. You can personalize a multimedia greeting using your snapshot or audio and video clip coupled with a text message. The greeting can then be sent via e-mail or saved to a floppy disk.—Yvonne Koulouthros

Trends Peripherals

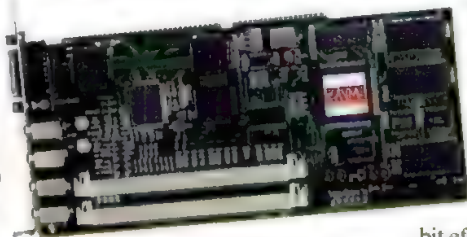


Making Beautiful Music

You've decided to treat yourself to a new sound card. Whether you want to heighten your multimedia gaming experience or perform such complex tasks as composing or editing music, three new cards deserve a look.

Geared primarily toward the midlevel user, the \$199 **Sound Blaster AWE64** and the \$249 **Sound Blaster AWE64 Gold**, from Creative Labs (800-998-1000, www.soundblaster.com), offer 64-note polyphony (the ability to play 64 notes simultaneously), advanced wavetable samples from E-mu Systems, Creative's SoundFont technology, and 3D Positional Audio. The news here is Creative's use of WaveGuide, a new physical-modeling technology, in samples that reproduce in-

strument sounds. Creative claims the result is more true-to-life than even wavetable samples.



WAVED BY THE SOUND: AVM's Apex uses Kurzweil samples.

Both cards include a microphone and a slew of tools to record and customize audio. And to promote beautiful music over the Internet, Creative adds RealAudio Player, Internet Explorer, NetMeeting, and WebPhone.



0041, www.avmtechnology.com) has teamed up with Kurzweil Music Systems (the creator of professional wavetable synthesis) to develop a wavetable sound card that packs the power and versatility of a keyboard synthesizer. The \$299 **Apex** is based on Kurzweil's MA-1 chip set and features true 32-note polyphony, a 20-bit DAC for professional-level output, and 2MB of Kurzweil samples stored in ROM. Its 24-

bit effects processing allows for a full range of audio effects, such as reverb, chorus, delay, flange, and distortion. Sample Sound Technology (SST) lets you download 64MB of audio samples and use any .WAV file as a MIDI instrument. The Sound Blaster-compatible card also includes Cakewalk SE, MIDI sequencing, and a patch editor for fine-tuning MIDI samples.—Toni Kistner

DVD-ROM

DVD's Debut

After a drumroll that lasted well over a year, the first generation of DVD-ROM drives are finally here to play the movies, games, encyclopedias, and database applications that are coming to market; the drives can also handle regular CD-ROM disks at 10X speeds. If you aren't planning to buy a DVD-equipped PC, don't despair: Several vendors are readying DVD upgrade kits, which give you all the pieces necessary to outfit your system.

The offering from Panasonic (800-742-8086, www.panasonic.com), the **Panasonic DVD-ROM LK-MV8581BP**, is a plug-and-play package that costs about \$1,000. It includes a drive and a DVD-AV decoder board that supports MPEG-1 and MPEG-2 video playback and Dolby AC-3, MPEG, and Linear PCM audio playback. The drive

interface with a data-transfer rate of 1,380 Kbps. It includes software that loads into the Windows 95 control panel to manage the DVD disks, the



MAKING AN APPEARANCE: DVD-ROM drives are being offered by Creative Labs, Diamond Multimedia Systems, and Panasonic (above).

Windows 95 drivers, the cables, and Panasonic's Visual Entertainment Town disk, which demonstrates DVD's capabilities.

The kit from **Creative Labs** (800-998-1000, www.soundblaster.com), which Creative expects to have available by March, will start at \$499. It includes the drive, AC-3 audio decoding, an MPEG-2 video card, and software.

In addition, **Diamond Multimedia**

(www.diamondmm.com) has teamed up with Toshiba to develop a DVD-ROM kit. Expected to ship by March and cost from \$600 to \$1,000, it will include

Diamond's PCI-based adapter and feature MPEG-2 video and Dolby AC-3 audio decoding.

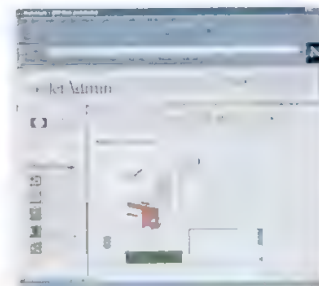
Because the first DVD disks hold about seven times as much data as CD-ROMs, it can only be a

matter of time before DVD readers replace CD-ROM readers entirely. Digital Directory Assistance has already put out the DVD version of its PhoneDisc—a set of six CD-ROMs—and Xiphias's Encyclopedia Electronica, which includes entries for over 40,000 topics, a video atlas, and more than 90 minutes of other video, is in the works. Don't toss out your audio and multimedia CDs just yet, though. DVD drives play them



Surf Your Printer

More network peripheral makers are thinking of letting administrators use Web browsers to monitor and control shared devices. Major UPS vendors, including APC and Hewlett-Packard, have already rolled out browser-based



WWW.PRINTER? Web JetAdmin lets administrators control printers from any browser-equipped PC.

front ends for their power products. The latest announcements come on the printer front.

Market leader HP (800-752-0900, www.hp.com) is first out of the gate with the management package **Web JetAdmin**, which is based on HP's award-winning JetAdmin software. The Web version lets Windows NT administrators view and control HP and other printers connected to the network. Web JetAdmin is especially well-suited for on-the-go IS types in large corporate environments, since any browser-equipped PC offers access to various printer functions (protected by three levels of security checks). Web JetAdmin is available free of charge on the company's Web site.

Xerox (800-275-9376, www.xerox.com) offers a similar utility for its network printers. **CenterWare** (included with current Xerox printers) lets administrators and end users employ the Net to manage print jobs, configure printers, upgrade software, and monitor device status. Expect to see similar announcements from Lexmark, Kyocera, and others later in the year.—Jamie Reulke

Looks like a floppy drive, feels like a
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WEB-ANALYSIS TOOLS

Policing Web Site Traffic

Whether you run a large commercial Web site or a low-priority site for a small branch of your business, you still need to know who stopped by to visit, where they came from, and what they wanted. A number of new Web-traffic-analysis tools can help you examine this information with increasing detail.

e.g. Software's **WebTrends 2.2** (503-294-7025, www.webtrends.com) is a scalable traffic-monitoring tool for small or moderate-priority Web sites, including intranets. Priced at \$299, WebTrends tracks visitors' paths to and through a Web site and reports if they successfully downloaded any information. WebTrends also includes automatic configuration for actively running Web servers.

Competing with WebTrends are Marketwave's \$345 **Hit List Standard 2.0** and **Hit List Profes-**

sional 2.5 (800-521-8176, www.marketwave.com). Hit List Standard also tracks user paths to and through a site and tallies download attempts. Rather than relying on the server's log file, Hit List creates its own database. It also features Virtual Domain Support, a customizable auto-querying function that gives administrators reports on the virtual domains of their choice every morning.

The \$1,995 high-end professional version adds extensive search functionality. Hit List Pro can tell you the average number of pages that users coming from a certain site tend to view, and it can parse search strings from other sites, such as Yahoo! (or from such data-

bases as Cold Fusion), to determine exactly why and how a user comes to your site. It also offers extensive querying capabilities for click-through rates of specific online advertisements.

Accrue Insight, from Accrue Software (415-969-9031,

PIE IN THE SKY: You can generate traffic reports with Accrue Insight.

www.accrue.com), uses its own Java-based technique to monitor a user's click pattern in real time. With pricing starting at \$15,000, Insight is designed for high-volume, high-priority sites. Insight can collect and store data on more than a million hits per hour, gathering not only the number and sequence of user hits, but also the number of bytes served, the browser type, and the user-domain breakdowns. There's also such network performance data as

download and server-response times.

The resulting data is stored in the most granular form possible to allow for the widest variety of sorting, analysis, and report-generation possibilities. Although currently available only on the Sun Solaris/SPARC platform, Insight can monitor servers on any platform.

Keynote Perspective, from Keynote Systems (415-524-3000, www.keynote.com), approaches the problem of user activity and response time from the perspective of the user. Designed as a quality-control tool for ISPs and their Web sites, Perspective detects connection failures and preemptively warns of the need to reroute. Prices vary, but you can track one URL for \$1,520 per month.

Perspective is built around three software components: agents, server, and desktop. Agents track user experience in the ISP or Web site by sending out electronic proxy users, which perform a series of hits. The results are tracked and tabulated into a database, from which reports can be generated. The Perspective Agent software is written entirely in Java for maximum cross-platform compatibility.—Josh Levy

WEB BROWSERS

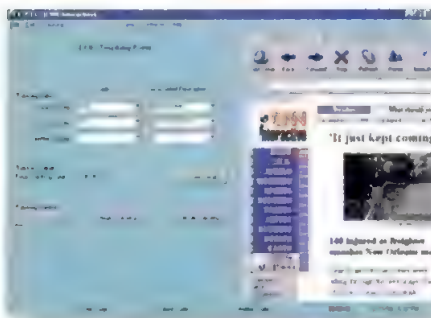
Working in Web Time

Your office needs to be using the Web as a resource for news and research, but you also want to be able to monitor your Internet

Client (E.P.I.C.) lets you track the amount of time spent at each Web site and log where you go on the Web and for whom. The product was in beta at press time but should be available by the time you read this.

E.P.I.C. is designed especially for professionals with billable hours, such as attorneys. Billing and tracking components are built directly into the browser. You can also integrate the browser with popular project-management packages.

E.P.I.C. contains an Internet e-mail client to monitor incoming and outgoing e-mail, and it includes a screening component to block access to Web sites that are unrelated to business purposes.—David Lidsky



BILLABLE SURFING: E.P.I.C.'s Web browser.

usage for billing and productivity reasons. Equitrac Corp. (800-327-0183, www.equitrac.com) has a \$99-per-seat Web browser based on Microsoft Internet Explorer 3.0 that fits your needs.

Equitrac's Professional Internet

INTRANETS

Building an HR Intranet

Many companies have found that placing human resources information on a corporate intranet can prove valuable in giving employees access to data and freeing up HR professionals from mundane tasks. Two companies provide solutions in this arena that can build an intranet from your legacy data.

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ee directory in HTML with hyperlinks and table-of-contents pages. Templates are included for building HTML pages with ease.

Beginning at \$80,000, **Seeker HR**, from Seeker Software (510-433-9310, www.seekersoft.com), can be placed on top of your old HR system to bring your HR department to the Web. Seeker HR is based entirely on open standards, such as HTML and Java. The product allows employees to update their own skill sets as they learn on the job with the Career Development Plan, which eases the task of finding appropriate internal candidates for job openings.—DL



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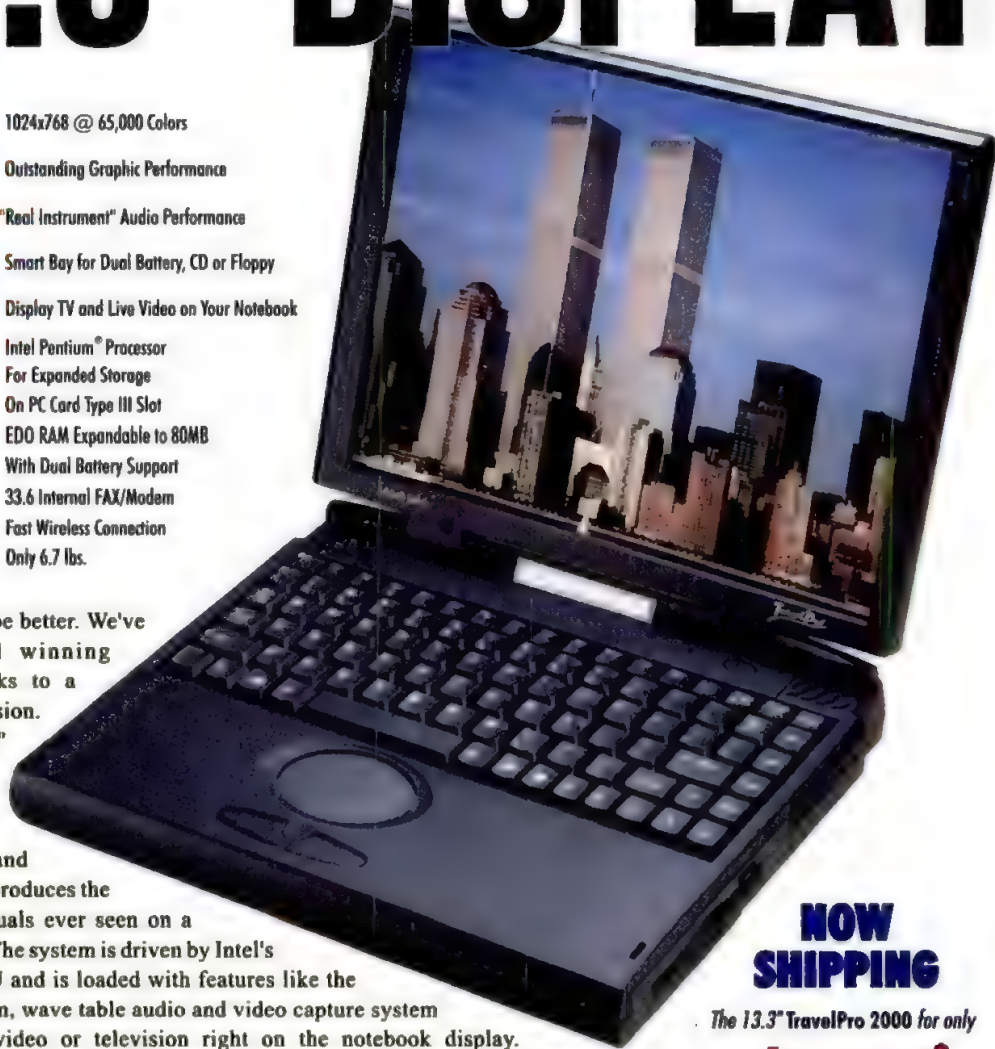
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TravelPro 2000CX	4,695	13.3" 1024x768	TravelPro 2000CX	4,695	13.3" 1024x768
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January 1997

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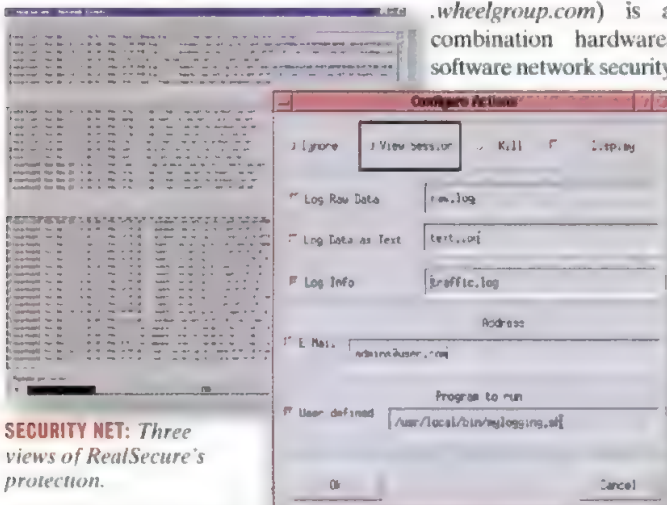
NETWORK SECURITY

Protecting Against Hackers

Companies are increasingly embracing electronic commerce and doing business via corporate intranets, making the demand for heightened network security

them back, a useful—if unusual—feature for determining the identity and intent of the intruder.

WheelGroup Corp.'s **NetRanger** (210-494-3383, www.wheelgroup.com) is a combination hardware/software network security



SECURITY NET: Three views of RealSecure's protection.

greater than ever. Several new products have sophisticated features designed to go beyond the capabilities of a firewall and combat the most dangerous of security threats—the hacker.

Internet Security Systems' \$4,995 **RealSecure** (770-395-0150, www.iss.net) patrols your network, analyzing packets and looking for known patterns of attack. The software is currently available for Linux, Solaris, Sun, and Unix platforms; a Microsoft Windows NT version should ship this spring.

RealSecure has three main components. The Recognition Engine monitors the network in real time and reports events to the Administrator's Module. The Response Engine reacts to attacks by logging them, posting alerts, or terminating the connection, depending on the network administrator's preference. The Administrator's Module, which also serves as the user interface, allows network administrators to monitor and manage the other two engines from a single GUI.

The product can record a hacker's movements and then allow a network administrator to play

management system for Unix. Like RealSecure, it gets its data from analyzing packets.

The Network Security Exchange (NSX) hardware modules, which are sold individually, sit in front of various points of network vulnerability—Web servers or remote-access connections, for example—to provide real-time monitoring. The NSX modules communicate with the NetRanger management software, Director, which can be launched with HP's SNMP-based management system, OpenView. Director allows network administrators to identify alarms and offers possible responses. Pricing starts at \$15,995 for the Network Security Exchange modules.

For those who don't have the time or inclination to monitor the activity of the modules, Wheelgroup offers optional 7-day-a-week, 24-hour-a-day technical support.

Unlike RealSafe and Net-



Ranger, Haystack Labs' **WebStalker-Pro 1.0** (\$4,995 for the Unix version; \$2,995 for the Windows NT version) relies on operating-system audit-trail information to patrol for hackers. Once loaded onto individual Internet and intranet Web servers, WebStalker guards against external and internal attacks.

Haystack Labs (512-918-3555, www.haystack.com) says the next version of WebStalker will enable you to protect multiple Web servers from a single machine. In addition, it will provide protection from a greater variety of attacks and have more response possibilities. At the moment, network administrators can only shut down a hacker's connection or restart the Web server when a security incident is detected. —Michelle Schoenung

EMULATION

A New Face

Terminal-emulation applications are not known for pleasing aesthetics or ease of use. But several new offerings swap the typical, clunky, character-based interface for slicker Web technology. This not only makes it easier for network administrators to deploy and manage terminal-emulation applications but makes it easier for users to access mission-critical data as well.

Open Connect Systems' **OC://WebConnect Gold** (972-484-5200, www.oc.com) relies on Java applets to provide terminal emulation. Clients simply download a 35K Java applet from the Web server. Because everything is centrally located on the Web server, this enables the network administrator to bypass the typically costly and timely terminal emulation setup and configuration process normally required at each desktop.

OC://WebConnect Gold (\$495 for a site license, \$49 per concurrent user) offers data-encryption and full Netview support. It can be used to access TN3270, TN5250, and VT220 applications.

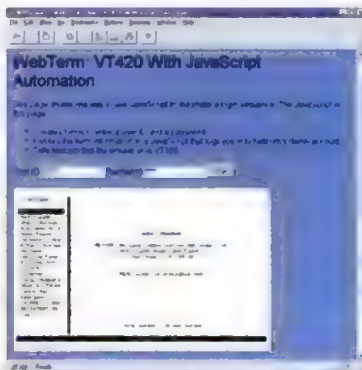
Similar to WebConnect Gold is White Pine Software's **WebTerm Toolbox** (603-886-9050, www.wpine.com). WebTerm Toolbox (\$69 per emulation) also uses plug-ins. But White Pine's Power Plug-ins are Netscape applets, not Java applets. Network administrators simply configure a session and up-

load it to the Web server. It can then be accessed from anywhere on the network by any user who has a browser that supports Netscape's plug-in technology.

WebTerm's TN3270, TN525, and VT420 emulations enable Web browser access to legacy data on AS/400, IBM, and Unix/VMS mainframe hosts.

MultiView 2000 (\$199 per license.), from JSB Corp. (800-359-3408, www.jsb.com), is a 32-bit terminal-emulation package for Windows 95 or Windows NT—to-Unix connectivity. MultiView's Rules Agent lets users embed hyperlinks into Unix applications. You can utilize the hyperlinks to launch e-mail, view intranet pages, transfer files, or access PC applications from the terminal-emulation window. JSB refers to this as ActiveURL technology.

The Kiosk feature lets you create an intuitive user interface. Kiosk contains a variety of different objects that can be used as icons to represent specific functions—a telephone for your address book, for example.—MS



EMULATION: White Pine Software's WebTerm Toolbox.

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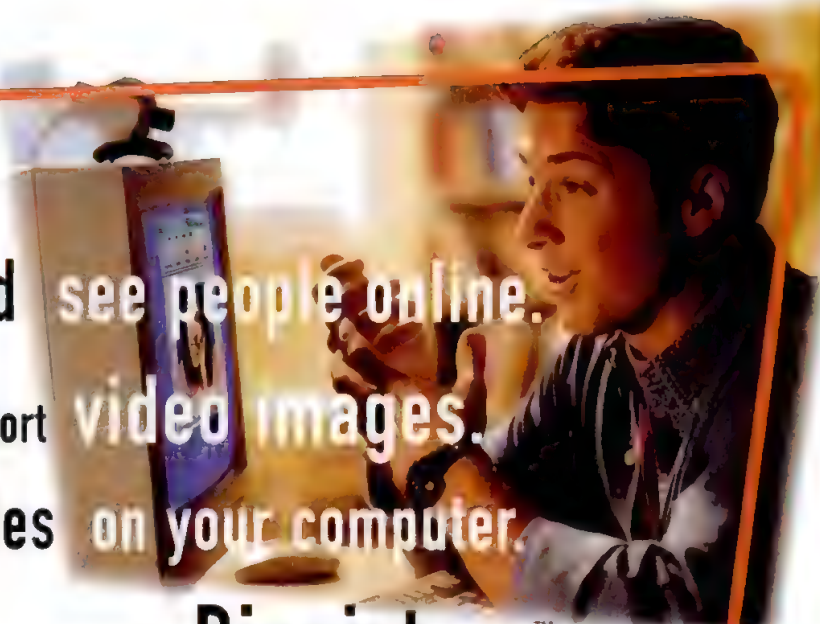
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First Looks

The MMX Files

The price is right for the first MMX-enabled Pentium notebooks, which offer high performance at no premium.

—By Carol Venezia, Cade Metz, and John Morris

If you're tired of waiting six months for the latest desktop PC innovations to filter down to notebooks, your prayers may have been answered. Intel's Pentium Processor with MMX Technology is now ready for both desktop and low-voltage mobile applications.

Granted, if you must have the very fastest Pentium processor available—in this case, 200-MHz—you'll still have to opt for a desktop system. The first MMX-powered notebooks run at either 150 MHz or 166 MHz, and Intel will reportedly follow up with a budget-minded 133-MHz version by summer. Further off on the horizon is a 200-MHz mobile MMX CPU.

Eager to MMX-ize its entire

CPU lineup, Intel is rolling out both CPUs at the same time. More evolutionary than revolutionary, MMX adds 57 instructions to the standard Pentium chip to speed multimedia performance. This is the first significant enhancement made to the x86 instruction set since the advent of the 386 over ten years ago. (For more details, see "How MMX Technology Works," February 4, 1997.)

PARALLEL UNIVERSE

The new MMX instructions use a technique called single-instruction multiple-data, or SIMD, which allows the CPU to operate on two, four, or eight data elements at once without slowing down. MMX accomplishes this

task by packing multiple 8-, 16-, or 32-bit values, or operands, into a single 64-bit register and operating on all of them in parallel. These instructions only kick into gear, however, when the system is using MMX-enabled software.

If you're expecting such software applications as Microsoft's ubiquitous Office suite to speak MMX, you're out of luck for now. In fact, the first MMX-enabled applications on the market are decidedly *unbusinesslike*. The majority are games and include Ubi Soft's POD and GT Interactive Software's Rebel Moon Rising. There's also a smattering of photo editors (Adobe's Photoshop and Photo-Deluxe), MPEG video players (Mediamatics' Arcade Pak), and edutainment titles (Dorling Kindersley's The Ultimate Human Body 2.0 for MMX). The lack of an MMX-aware word processor is not a big deal, because although MMX can do wonders for audio, 2-D and 3-D graphics, and video, it can't speed

INSIDE



I WANT MY WEB TV: Sony, Philips Magnavox, and Sega invite you to watch the World Wide Web in your living room. See page 62.



PICTURE THIS: CorelDraw 7 Graphics Suite is bigger, better, and faster than ever. See page 66 for the review.

GO TO THE TAPE: Intel's Smart Video Recorder III offers an affordable way to capture video on your PC. See page 70 for a full review.



More Products Reviewed...

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Email America	70
ACT! 3.0	73
ECCO Pro 4.0	73
Six OS/2 utilities	76

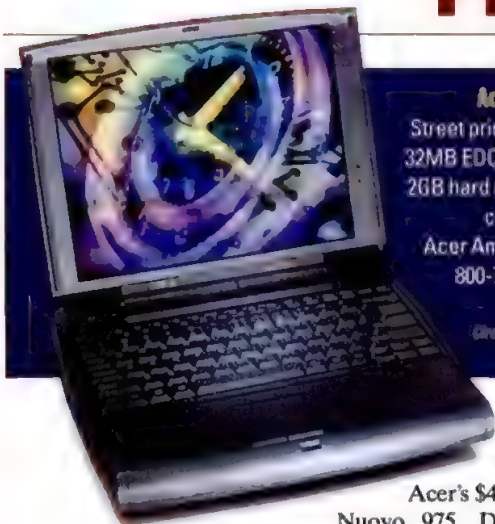
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THE LEADING CONTENDERS: (from left to right) The Toshiba Tecra 740CDT, the Micron TransPort XPE, and Acer's AcerNote 4900.

First Looks



AcerNote Nuovo 975

Street price: With MMX Pentium/166, 32MB EDO RAM, 256K external cache, 2GB hard disk, 12.1-inch active-matrix color display, \$4,600.

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out of the gate come from the top players:

Acer's \$4,600 AcerNote Nuovo 975, Digital's \$4,800 HiNote VP 545, Gateway 2000's \$4,149 Gateway Solo 2100 P5-150 MMX, Micron's \$4,999 TransPort XPE, Texas Instruments' \$5,000 TI TravelMate 6160, and Toshiba's \$6,740 Tecra 740CDT. Gateway's Solo and Digital's HiNote VP pair the slower 150-MHz chip with 40MB of memory; the rest use the faster 166-MHz CPU with 32MB of memory.

Although these are for the most part derivative systems, the group contains two firsts: the first 13.3-inch display and the first notebook with 512K of external cache. The Tecra's screen is made by DTI (a joint venture between Toshiba and IBM) and features XGA resolution. Although it provides about the same display space as a 15-inch CRT monitor, at 1,024-by-768 resolution you could get a headache from all that

squinting. But despite this power-hungry panel, the Tecra managed an impressive 3-hour-and-11-minute battery time.

On the other hand, the TravelMate's extra-large external cache didn't deliver the expected performance boost. We suspect that the TravelMate's CPU-to-memory subsystem has not yet been optimized to take full advantage of the extra external cache.

To gauge the worth of these developments, we ran a combination of our traditional benchmark tests and a suite of MMX-enabled applications. Compared with the average Pentium/133 notebook (see "Affordable, Portable, Notebook PCs," January 21, 1997), we saw an average overall performance kick of about 50 percent. These results should be weighed carefully, however, because system memory sizes and the notebooks' display resolutions varied.

WINNING THREESOME

Of the six systems, three stood out. The TransPort posted top scores on graphics, disk, and processor tests. The Nuovo's most impressive result was its BatteryMark time of 5:25, and the Tecra led the pack with a CD-ROM

WinMark 97 score far better than that of the next-best system.

What you buy depends as much on what you need and how much money you can spend. If you crave the most powerful notebook, then MMX is for you. Today's MMX-enabled applications may not be typical fare for road warriors, but the CPU's external cache speeds performance.

All of these notebooks are worthy contenders for the power hungry. Gateway's Solo stands out as a great buy: It's not only the lowest-priced notebook here; it comes equipped with 40MB of RAM. The Tecra is also notable for its gorgeous, ample display, and the Acer Nuovo is the battery king.

But in keeping with the nature of these beasts, the Micron TransPort, with its combination of raw power, near-desktop-level components, and attractive price impressed us most and gave it an edge over its competitors.

Acer America Corp.

AcerNote Nuovo 975

Its name evokes the design traditions of Italy, but the AcerNote Nuovo 975, from Acer America Corp., is more than just another pretty face. Engineered to be a desktop-replacement system, the \$4,600 Nuovo boasts an MMX Pentium/166 processor, a full complement of multimedia and communica-

SUMMARY OF FEATURES

MMX Notebooks: Side by Side

PC MAGAZINE
EDITORS' CHOICE

	AcerNote Nuovo 975	Digital HiNote VP 545	Gateway Solo 2100 P5-150 MMX	Micron TransPort XPE	TI TravelMate 6160	Toshiba Tecra 740CDT
In alphabetical order by company						
Price of tested configuration	\$4,600 (street)	\$4,800 (street)	\$4,149 (direct)	\$4,999 (direct)	\$5,000 (street)	\$6,740 (list)
System/travel weight (pounds)	7.7, 8.5	7.1, 8.0	6.9, 7.8	7.5, 8.2	6.1, 7.0	8.8, 9.7
Dimensions (HWD, in inches)	2.2 x 12.2 x 9.4	1.9 x 11.8 x 8.9	1.9 x 11.3 x 9.0	2.1 x 11.8 x 9.3	2.2 x 12.0 x 9.0	2.5 x 11.8 x 9.1
CPU and installed RAM	MMX Pentium/166, 32MB EDO	MMX Pentium/150, 40MB EDO	MMX Pentium/150, 40MB EDO	MMX Pentium/166, 32MB EDO	MMX Pentium/166, 32MB EDO	MMX Pentium/166, 32MB
LCD-panel specifications	12.1" active-matrix SVGA	12.1" active-matrix SVGA	12.1" active-matrix SVGA	12.1" active-matrix SVGA	12.1" active-matrix SVGA	13.3" active-matrix XGA
Graphics chip set	NeoMagic MagicGraph128zv	NeoMagic MagicGraph128v	Cirrus Logic CL-GD7548	Cirrus Logic CL-GD7555	NeoMagic MagicGraph128	Chips and Technologies 6554 PCI
Hard disk capacity/CD-ROM speed	2GB, 10X	1.44GB, 6X	1.3GB, 6X	2.1GB, 8X	2GB, 10X	2GB, 10X
Battery type	Lithium ion	Nickel hydride	Lithium ion	Lithium ion	Lithium ion	Lithium ion

tions features, and the longest-lasting battery available today.

The Nuovo's sleek design is dressed in basic black and has a case that wraps around its tilt-up keyboard and then tapers off at the sides, leaving enough room for the wrist rest and built-in touchpad. Too bad this sculpted profile doesn't translate into a smaller or lighter system. The Nuovo weighs in at 7.7 pounds, has a total travel weight of 8.5 pounds, and at 2.2 by 12 by 9.5 inches, it was within a few tenths of an inch of the Tecra, the largest notebook of this sextet.

With the Nuovo, good looks is just the start. At nearly five and a half hours, the unit's battery life led this group of six MMX notebook PCs by a wide margin. Acer attributes the superior battery life to its proprietary Heuristic Power Management software, which can learn the user's work habits and usage patterns, and then tailor system settings to get the most out of the Nuovo's lithium ion battery.

What you give up for this exceptional battery time is a power switch, which can be annoying. There is a small switch in the center of the display hinge that automatically turns the power on when you open the 12.1-inch active-matrix display and switches things off when you close it. A useful suspend-to-memory feature allows you to close down the system quickly by shutting the display and then resume working where you left off later without rebooting.

The rest of the Nuovo's specs were impressive: an MMX-enabled Pentium/166 CPU, 32MB of EDO RAM, 256K of external cache, and a 2GB hard disk. An included cable allows you to use the floppy disk and 10X CD-ROM drives simultaneously—which is a bonus—but one must reside externally.

Other features key in on communications. There's a pair of Type II PC Card slots, a set of integrated speakers, a

Editors' Choice

• Micron TransPort XPE



Although all six of these MMX-powered notebook PCs are worthy

contenders for the mobile power user's briefcase, one stood apart from the pack: the \$4,999 Micron TransPort.

As befits a notebook of this caliber, the TransPort offers a host of desktop-level features in its 7.5-pound package. The system augments its 166-MHz MMX Pentium processor with 256K of external cache and 32MB of EDO RAM; it has a 2.1GB hard disk and an 8X modular CD-ROM drive. These components—along with the TransPort's Cirrus Logic CD-GD7555 graphics engine—worked to produce this roundup's top scores on our graphics, disk, and CPU benchmark tests. The TransPort was also a standout performer on our MMX-enabled applications tests, notching a number-one score on the Kai's Power GOO measure.

microphone, a wireless IrDA port, and a 16-bit Sound Blaster-compatible audio system. Acer also includes an integrated 33.6-Kbps modem with the Nuovo.

On our benchmark tests, the Nuovo was a solid performer across the board, with average scores among the MMX systems we tested. But its ZD BatteryMark of 5:25 stands out as the score to beat. As for the MMX application tests, the Nuovo took first place on the PhotoDeluxe

Soften Image task, and its score on the Kai's Power GOO MMX-based chore was average.

We were impressed with the Nuovo, but a few things annoyed us. First, the system had a tendency to pause and display a Wait CD message during certain operations—perhaps a side effect of its overzealous power-management software. And the display latch and battery cover on our test unit never quite worked correctly, giving us

We also found two machines in this group worthy of honorable mention: the \$4,600 Acer-Note Nuovo 975 and the \$6,740 Toshiba Tecra 740CDT. The Nuovo's distinguishing characteristic was its lengthy battery life. Using Acer's Heuristic Power Management software, the system clocked a highly impressive 5 hours 25 minutes on our ZD BatteryMark measure—the best we've seen.

The Nuovo was no slouch in the MMX performance arena either. Powered by the 166-MHz version of the MMX Pentium CPU, the Nuovo logged this roundup's best times on our Adobe PhotoDeluxe tests.

Toshiba's Tecra notebooks have always stood out as technology leaders, and the new 740CDT is no exception. This machine's gorgeous 13.3-inch XGA display is an industry first and comes from the same vendor that debuted 12.1-inch XGA screens in the portables space in mid-1996. The Tecra complements this prodigious panel with a 166-MHz MMX Pentium processor, a 10X CD-ROM drive, ZPV and Card Bus support, and an integrated, cellular-ready 28.8-Kbps modem. And despite all these high-powered components, the Tecra's 5,600-mAh lithium battery managed an impressive 3:11 on our battery test.

presentation-class machine with enough juice to handle coast-to-coast flights and a package guaranteed to turn heads.

Digital Equipment Corp.

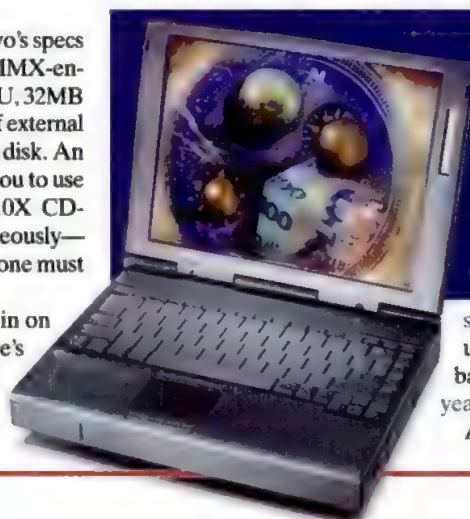
Digital HiNote VP 545

Designed to compete with the likes of the IBM ThinkPad 365 and Toshiba's Satellite series, the HiNote VP series, from Digital Equipment Corp., make up the company's value line of

notebooks for enterprise computing. But the \$4,800 HiNote VP 545 we tested, which was equipped with an MMX Pentium/150 CPU and 40MB of RAM, is any-

thing but a stripped-down notebook.

The HiNote VP's buttoned-down looks are designed to appeal to medium-size and large



HiNote VP 545

Street price: With MMX Pentium/150, 40MB EDO RAM, 256K external cache, 1.44GB hard disk, 12.1-inch active-matrix color display, \$4,800.

Digital Equipment Corp., Maynard, MA

800-642-4532, 508-493-5111

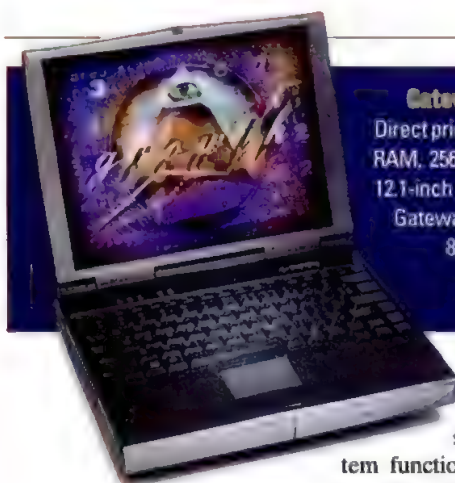
www.pc.digital.com

Circle 418 on reader service card.

some reservations about the unit's workmanship. Acer backs the Nuovo with a three-year warranty.

Add it all up and you've got a

First Looks



Gateway Solo 2100 P5-150 MMX

Direct price: With MMX Pentium/166, 40MB RAM, 256K external cache, 1.3GB hard disk, 12.1-inch active-matrix color display, \$4,149.

Gateway 2000 Inc., North Sioux City, SD

800-846-2000, 605-232-2000

www.gw2k.com

Circle 418 on reader service card.

LCD panel on the display's frame has icons for battery status and other system functions. The system is rounded out with a 16-bit audio system and built-in microphone and speakers. There are two Type II PC Card slots; the unit we tested did not have an internal modem.

Despite using enhanced nickel hydride batteries instead of

Note VP in the middle of the pack. To extend battery life, you can swap out the 6X CD-ROM drive and insert an optional second battery in the modular expansion bay; the second battery uses lithium ion cells.

The HiNote VP notched the best score on our ZD Winstone 97 test, but by only a slim margin. This is probably due to its extra 8MB of system memory. Other scores were solid, with the excep-

tion of its 455 thousand bytes per second on our ZD Disk WinMark 97 test, which was the worst score in the group.

With its balance of processing power, memory, and multimedia features, the HiNote VP is a notebook with plenty of staying power.

Gateway 2000 Inc.

Gateway Solo 2100 P5-150 MMX

The \$4,149 Gateway Solo 2100 P5-150 MMX, from Gateway 2000, is a modest corporate notebook that provides respectable performance and a choice software bundle at a price that's hard to beat. Like the HiNote VP, the Solo offsets its 150-MHz MMX Pentium processor with 40MB of

companies. Its gently-rounded, gray case measures 2 by 11.8 by 8.9 inches. The unit weighs 7.4 pounds (8.0 pounds with the AC adapter), which is in line with most presentation-class notebooks but no match for its sleek sibling, the 4-pound HiNote Ultra (First Looks, September 24, 1996).

Because the HiNote VP series comes with 8MB of memory soldered on the motherboard, you can expand to 16MB, 24MB, or 40MB of memory—but unlike with the other systems in this roundup, not to 32MB. In addition, the HiNote VP 545 has 256K of external cache and a 1.44GB hard disk. Later this year, Digital is expected to roll out a Pentium/166 MMX version that utilizes Card Bus and Zoomed Port Video PC Cards.

The HiNote VP comes with either Microsoft Windows 95 or Windows NT, but until Digital releases its upcoming Windows NT driver kit, which includes enhanced power management and plug-and-play functionality, you're better off with Windows 95. The HiNote VP series also includes Digital's ClientWorks; a port replicator with integrated Ethernet is a \$319 option.

The HiNote VP's 12.1-inch active-matrix display is driven by NeoMagic Corp.'s MagicGraph 128v graphics accelerator and is capable of displaying 64,000 colors at 800-by-600 resolution. A smaller, monochrome

PERFORMANCE TESTS

MMX Notebooks



The Micron TransPort XPE was the clear winner in this roundup, with top scores on our graphics, disk, and processor benchmark tests. The Toshiba Tecra 740CDT and the AcerNote Nuovo 975 were the contenders for second slot, with leading scores on the

ZD CD-ROM WinMark 97 and ZD BatteryMark tests, respectively.

On our suite of MMX-enabled applications tests, the Nuovo excelled on the Adobe PhotoDeluxe tests, and the TransPort achieved the best frame rate on our Kai's Power GOO Goovie test.

BENCHMARK TESTS

▲ Higher scores represent better performance.
▼ Lower scores represent better performance.

Bold type denotes first place.

	ZD Business Winstone 97 Score	ZD Business Graphics WinMark 97 Score	ZD Business Disk WinMark 97 Thousands of bytes per second	ZD CPUmark ₂ Score	ZD CD-ROM WinMark 97 Thousands of bytes per second	ZD BatteryMark Hours:minutes
AcerNote Nuovo 975	33	52	529	310	638	5:25
Digital HiNote VP 545	35	58	455	299	457	2:11
Gateway Solo 2100 P5-150 MMX	34	45	497	300	563	1:49
Micron TransPort XPE	34	74	722	333	623	2:08
TI TravelMate 6160	30	43	493	308	766	1:38
Toshiba Tecra 740CDT	34	46	592	319	900	3:11
Average Pentium/133 value notebook (1/21/97)	23	33	377	212	530	1:55

APPLICATIONS TESTS

	Adobe PhotoDeluxe: Soften Image Radius 2 (seconds)	Radius 10 (seconds)	Kai's Power GOO Goovie (frames per second)
AcerNote Nuovo 975	11.8	27.8	11.7
Digital HiNote VP 545	21.7	40.0	13.6
Gateway Solo 2100 P5-150 MMX	20.8	36.7	10.0
Micron TransPort XPE	30.6	12.5	15.3
TI TravelMate 6160	30.6	17.2	9.5
Toshiba Tecra 740CDT	37.0	25.2	14.5

To gauge the performance of these notebooks, we used ZD Business Winstone 97, ZD Business Graphics WinMark 97, ZD Business Disk WinMark 97, ZD CPUmark₂, ZD CD-ROM WinMark 97, and ZD BatteryMark. In addition, we timed how long it took to create a special effect using a 9MB TIFF file. We performed two Soften Image routines (for a radius of 10 and a radius of 2) in Adobe PhotoDeluxe. We also used Kai's Power GOO to create a Goovie animation sequence by concatenating multiple distorted images and measuring the number of frames per second during playback.

The HiNote VP and Gateway Solo 2100 were based on 150-MHz MMX Pentium CPUs with 40MB of RAM; the other systems had 166-MHz CPUs and 32MB of RAM. The companion group of systems all had 16MB of RAM. For the applications testing phase, each system was run at 800-by-600 resolution and 16-bit color depth.

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all the way...



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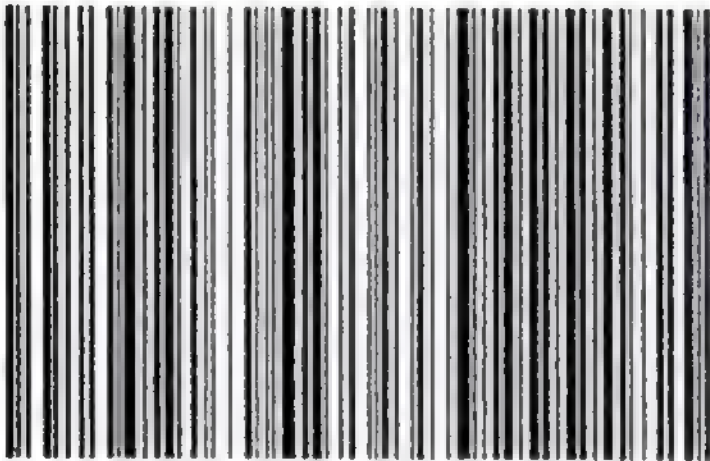
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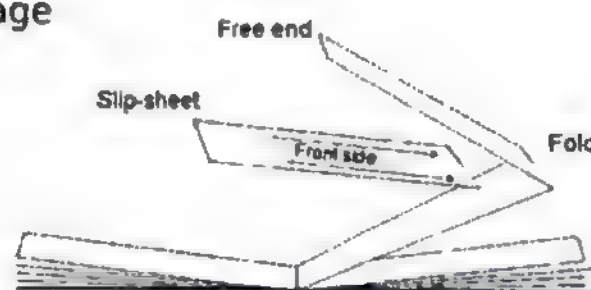
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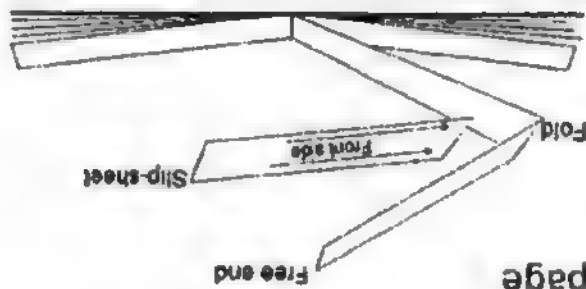
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Folded edge of the page

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
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4. Close the page and slip-sheet

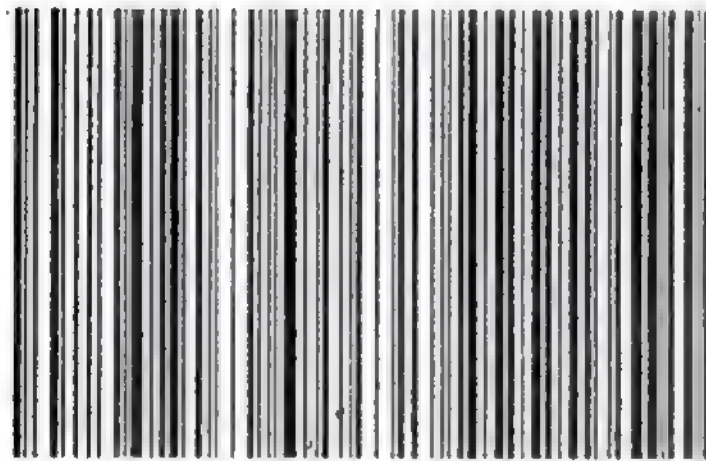


1. Open the foldout page
 2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
 3. Slice the folded edge
 4. Close the page and slip-sheet
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- Fold



1. Follow instructions on the other side

Inverted Back



GbsSlipBack-0018

Back

1. Follow instructions on the other side

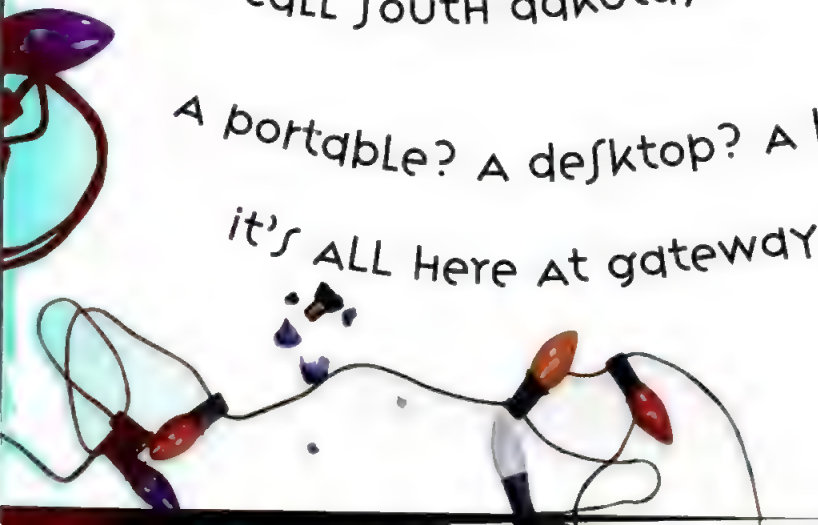
so WHAddYA **saY,**
and put them **aWay.**

its needles **aSunder,**
a cow-spotted **wonder!**



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Performance Graph



Ziff-Davis' Winstone 97 Version 1.0 produced scores of 16.9 and 36.4; 18.2 and 38.0; 18.5 and 37.4; and 20.2 and 42.7 Winstone Version 1.0 units on its Business Winstone 97 suite and High-end Winstone 97 suite on Gateway 2000, Inc. PCs configured with 166MHz Intel Pentium Processor with MMX technology, 200MHz Intel Pentium Processor with MMX technology, 180MHz Intel Pentium Pro processor and 200MHz Intel Pentium Pro processor, respectively. All Gateway 2000 PCs tested featured 32MB RAM, 256K RAM cache, 3.8GB hard disk, IDE controller, FAT file system, and no hardware disk cache. Systems include S3 ViRGE/VX graphics adapter, with 4MB VRAM with v1.23m3 driver, 1024x768 with 256 colors, and a refresh rate of 75Hz. Test systems used MS DOS 7.1 and MS Windows 95. All products used in the test were shipping versions available to the general public, and the test and its results were not verified by Ziff Davis.



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- **Altec Lansing ACS-251 Subwoofer \$75**
- **Altec Lansing ACS-410 Speaker System w/ ACS-251 Subwoofer \$120** (upgrade from PCs that include Altec ACS-41 speakers)
- **CD-Recordable \$429**
4X read/2X write recordable CD drive with SCSI controller, CD Creator 2 for MS Windows® and three media disks.
- **Iomega® Ditto™ 3200 Internal Tape Backup Unit \$199**
3200MB with compression, nominal 1600MB
- **Iomega External Zip 100MB Drive \$149**
- **Iomega Jaz™ 1GB Drive \$429**
(includes SCSI controller and 1GB cartridge)
- **MS Windows NT® 4.0 Upgrade \$99**
(upgrade from PCs that include MS Windows 95)

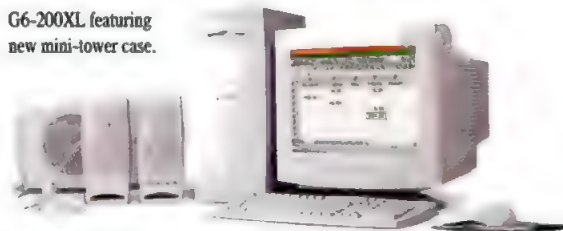
Portable PC Upgrades

- **Gateway Solo™ Mini Docking Bar \$199**
- **28.8 PCMCIA Data/14.4 Fax Modem \$200**
- **Upgrade from an 11.3" Dual Scan to an 11.3" Active Matrix SVGA color display \$380**
- **Upgrade from an 11.3" Active Matrix to a 12.1" Active Matrix SVGA color display \$150**
- **Intel Pentium Processors with MMX Technology available.**
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First Looks



TransPort XPE

Direct price: With MMX Pentium/166, 32MB RAM, 256K external cache, 2.1GB hard disk, 12.1 active-matrix color display, \$4,999.

Micron Electronics Inc., Nampa, ID
888-634-8799, 208-893-3434

www.mei.micron.com

Circle 408 on reader service card.

sults on the Photo-Deluxe tests.

With this sensible portable, Gateway offers headphones, a

casual carrying case, and a business-centric software selection, which includes Microsoft Bookshelf, Traveling Software's LapLink, Microsoft Money, Microsoft Office 95, and PhotoCD Lab. Gateway offers a one-year warranty.

Look for two enhancements to the Solo line: a 166-MHz MMX option that will cost about \$350 extra and an 8X CD-ROM. Though not our roundup's leading performer, the Solo has a low price and is supplemented with an assortment of practical accessories.

Micron Electronics Inc.

TransPort XPE



Since its debut last year, the TransPort has been one of the industry's preeminent notebooks. At \$4,999, the TransPort XPE, from Micron Electronics, is a study in balance. It combines high performance and value, resulting in a notebook that has a flexible design, a proficient graphics subsystem, and an aptitude for running MMX applications.

The angular, charcoal-color TransPort weighs in at 7.5 pounds and has a travel weight of 8.2

pounds; the system's dimensions are 2.1 by 11.8 by 9.3 inches. There are two front modular bays, each of which can accommodate a floppy disk drive, an 8X

CD-ROM drive, a second lithium ion battery pack, or an additional 2.1GB hard disk. But unlike with the Nuovo, you can't run the floppy disk drive externally while using the CD-ROM drive internally, or vice versa.

The good news is that the TransPort also has a 12.1-inch SVGA active-matrix display. And you have the choice of a touchpad or a pointing stick. The bad news is that you can't

and the TransPort's Winstone 97 result was right up there with the top score of the HiNote VP.

On our MMX application tests, the TransPort was similarly successful; it was an above-average performer on most Photo-Deluxe tests and delivered the roundup's highest Kai's Power GOO score. At the other extreme, the lithium ion battery had a life of just over two hours.

This TransPort has front and rear wireless IrDA infrared ports, which make performing wireless file transfers much more convenient. There's also an NTSC- or S-Video-out port for exporting video from the notebook. You can take advantage of Zoomed Video support, a built-in microphone, a game port, an integrated Card Bus

TI TravelMate 6160

Street price: With MMX Pentium/166 with MMX, 32MB EDO RAM, 512K external cache, 2GB hard disk, 12.1-inch active-matrix color display, \$5,000.

Texas Instruments Inc., Dallas
800-848-3927, 817-774-5856

www.ti.com

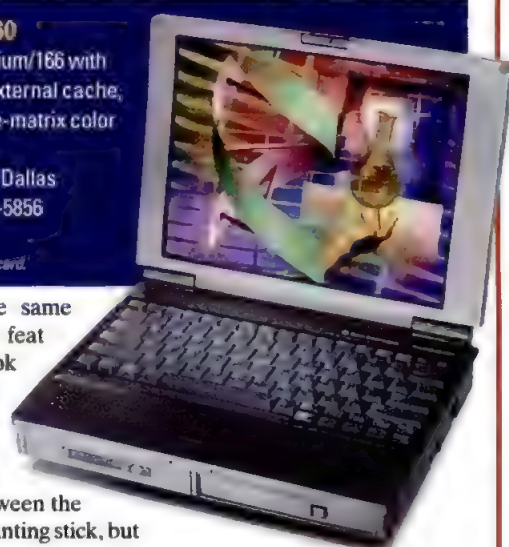
Circle 421 on reader service card.

use both at the same time, which is a feat that only WinBook Computer Corp. seems to have mastered. You can, however, easily toggle between the touchpad and pointing stick, but you have to reboot the system.

As befits an MMX system—which is ostensibly for use with intensive multimedia applications—this TransPort is equipped with 32MB of EDO RAM, 256K of external cache, and a 64-bit Cirrus Logic graphics accelerator with 2MB of VRAM. Such an adept graphics subsystem led to this roundup's highest Graphics WinMark score, which at 74.1 was just short of the mark for a top-flight Pentium/200 desktop system. The system's removable 2.1GB hard disk produced the leading Disk WinMark score,

controller, and a PC Card bay that can accept a pair of Type II devices. The TransPort comes with a 33.6-Kbps Motorola Montana PC Card fax/modem, which integrates telephony, cellular, and paging devices. Audio is provided by a 16-bit Sound Blaster—which offers both wavetable and FM synthesis—and stereo speakers that reside on the system's palm rest.

For an additional \$299, you can plug your TransPort into a Micron Dock Multimedia Port Replicator, which contains a



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First Looks

SCSI port, Ethernet adapter, and higher-quality speakers, along with duplicated port connectors. While the main battery in the notebook is being charged you can drop a battery into the replicator for charging—a time-saving bonus.

The \$4,999 price tag includes Microsoft Bookshelf, Microsoft Office Pro 95, Quicken SE, a 5-year warranty on the processor and main memory, and a 3-year system warranty. Such amenities are welcome, but they are not nearly as significant as the TransPort's noteworthy performance, industry-leading design, and remarkably low price.

Texas Instruments Inc.

TI TravelMate 6160

The new flagship of Texas Instrument's high-end notebook line, the TI TravelMate 6160, from Texas Instruments, has impressive credentials, but it never manages to rise above mediocrity. The \$5,000 system boasts a 166-MHz MMX Pentium processor, 32MB of EDO RAM, and 512K of external cache. Unfortunately, that didn't translate into leading-edge scores on our benchmark tests.

Designed for the mobile professional, the TravelMate weighs in at a relatively light 6.5 pounds and at just over 7 pounds with the AC adapter; the unit measures 2.2 by 12 by 9 inches. On board are all the features you need for presentations, including Zoomed Video port compatibility on one of its two Type II card slots for playing MPEG video.

Like the Nuovo and HiNote VP, the TravelMate's 12.1-inch active-matrix display is supported by NeoMagic Corp.'s MagicGraph graphics accelerator and can display 64,000 colors at 800-by-600 resolution. But the TravelMate lagged significantly behind the pack on graphics tests.

The unit features built-in 3-D Spatializer sound, and stereo speakers are integrated into the

wrist rest. Like the Tecra, the TravelMate relies on a pointing stick rather than a touchpad.

There are two bays mounted in the front for the lithium ion battery and the 10X CD-ROM drive, and an LED on the front of the battery lets you check battery status at any time. You can swap the CD-ROM drive for a second, optional battery, and TI offers a variety of DockMate port replicators. TI tops the TravelMate off with a PC Card 33.6-Kbps modem and a built-in wireless IrDA port.

The TravelMate didn't fare well on our benchmark tests. It posted the lowest scores on ZD Business Winstone 97 (30) and ZD Business Graphics WinMark 97 (42.7), and it lagged on the ZD CPUmark32 test as well. Its ZD BatteryMark score of 1:38 was disappointing and insufficient for most professionals who travel frequently.

In short, the TI TravelMate 6160's features read like a wish list for portable computing, but its performance on our tests leaves something to be desired.

Toshiba America Information Systems

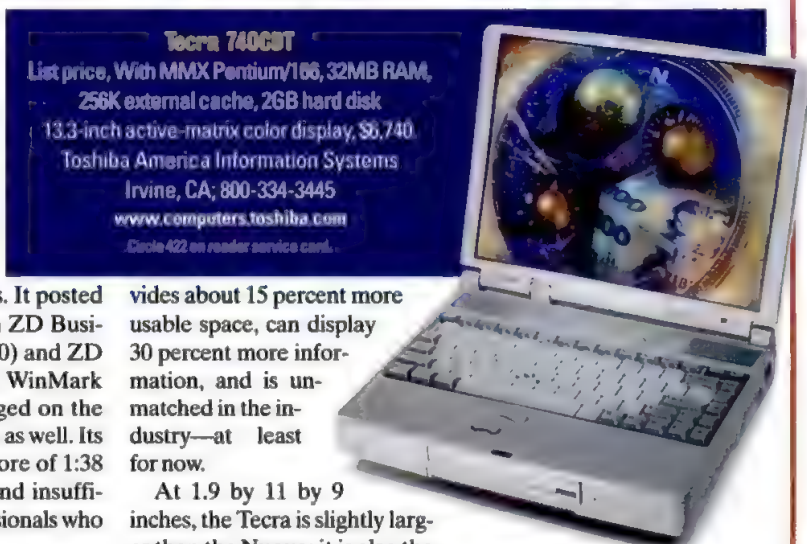
Tecra 740CDT

The most significant new feature of the \$6,740 Tecra 740CDT, from Toshiba America Information Systems, is neither its 166-MHz MMX Pentium processor nor its 10X CD-ROM drive. The big news is that after introducing the first 12.1-inch XGA screen about six months ago, Toshiba leads the pack again with the first 13.3-inch active-matrix color display. The most expensive, biggest, and heaviest system in this group of six systems, traveling with the Tecra is like taking a full-fledged desktop PC on the road.

Open the case and the eye is

naturally drawn to the Tecra's large and vivid screen, which has been integrated into the same case that holds the 12.1-inch display. Its resolution reaches to 1,024 by 768 pixels—the only XGA system on the market—and it has roughly the display space of a 15-inch CRT monitor. Compared with a 12.1-inch SVGA screen, this display pro-

hard disk produced an average Disk WinMark score, while its Chips and Technologies graphics accelerator (with 2MB of EDO RAM) turned in a Graphics WinMark score that was below average. But it was the only system that we tested at 1,024-by-768-pixel resolution; the others were tested at 800-by-600.



vides about 15 percent more usable space, can display 30 percent more information, and is unmatched in the industry—at least for now.

At 1.9 by 11 by 9 inches, the Tecra is slightly larger than the Nuovo; it is also the heaviest of the six. The Tecra is a soft gray in color with rounded edges and a pale-green pointing stick in the middle of its keyboard.

The Tecra's two stereo speakers and volume control knob reside above its keyboard, and a CD-ROM drive is integrated into the front of the machine. This quick drive—which spins at 10X speed—turned in a CD-ROM WinMark score that the other five machines did not even come near.

On the right side, there's an integrated, cellular-ready 28.8-Kbps V.34 DSP voice/fax modem that can be used as both a speakerphone and an answering machine. With a video camera and the included Intel ProShare package, the system can support mobile videoconferencing over standard phone lines.

On the whole, the Tecra's benchmark scores were a mixed bag. Its 2GB removable

At the other extreme, the Tecra's CPUmark₃₂ led the group, and its Winstone 97 results were just behind the HiNote VP's group-leading score. Despite its having the largest display of the six systems, the Tecra managed an excellent battery time of 3:11. During MMX applications testing, the Tecra's PhotoDeluxe scores were about average, but its Kai's Power GOO results were the roundup's second highest.

The Tecra is equipped with a panel that covers the on/off button, a rear, wireless IrDA infrared port, a built-in microphone, a full set of audio ports, and Zoomed Video and Card Bus support; a 16-bit sound card with wavetable and FM synthesis provides quality audio. Toshiba backs the Tecra with a 3-year parts-and-labor warranty; on-site service costs an additional \$49.95 per year.

Though the Tecra 740CDT carries a lofty price tag, it provides the widest outlook.



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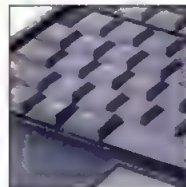
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*Preliminary measurement

OUR NOTEBOOKS AS SEEN
FROM A HOLY COW PERSPECTIVE.



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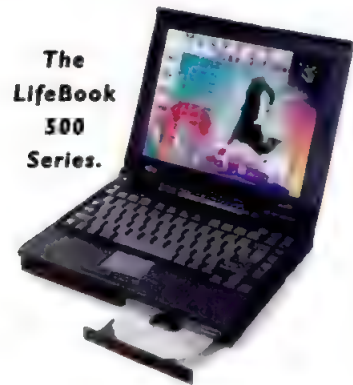
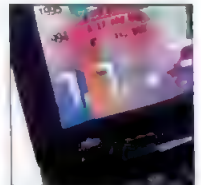
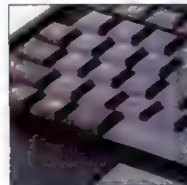
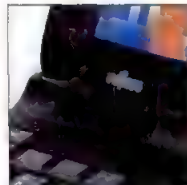
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First Looks

DESKTOP PUBLISHING

Publishing the Easy Way

Publisher 97 expands on earlier versions by adding Internet and mail-merge features.—By Edward Mendelson

With Publisher 97, Microsoft has made a powerful desktop publishing package spectacularly flexible and easy to work with. This version (\$80) advances beyond producing effective newsletters, brochures, printed forms, and greeting cards to building complete Web sites and performing complex mail-merge operations.

Publisher's hand-holding may annoy experienced users, but the program's target audience of home and small-business users will appreciate its near-perfect precooked layouts and automated conveniences. Wizards do much of the work of creating flyers, labels, brochures, banners, resumes, calendars, business forms, menus, and dozens of other formats. After Publisher creates a layout, you click on the sample text block to replace it with your own text. Similarly, you right-click on graphics to replace them with your own or with any of the more than 5,000 images on the CD-ROM version.

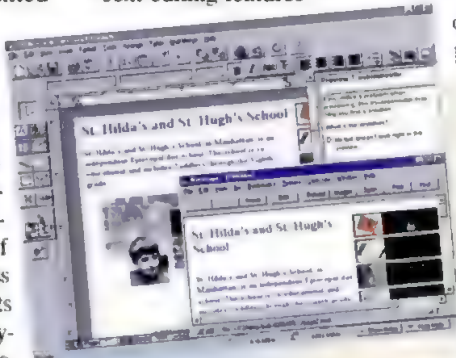
PERSISTENCE OF MEMORY

The program remembers addresses and phone numbers, and it can recall which of its various styles (modern, classic, jazzy, and so on) you chose for earlier publications, letting you keep your documents consistent. When you need a break from work, Publisher can show you how to create paper airplanes and origami.

Publisher's layouts are impressively stylish. If you create your own designs, Layout Checker alerts you to such flaws as excess margins at the top of

the page. The subtle and well-drawn clip art looks far more professional than that supplied by other vendors. And a clip-art gallery has tabbed pages for vector drawings, bitmaps, sounds, and video clips.

Text-editing features



THROUGH RAIN, SNOW ▶

Publisher's mail-merge, like that of advanced word processors, lets you preview output on-screen before printing.

include the insertion of typographic quotation marks when you type straight quotes, the insertion of dashes when you type two hyphens, and the automatic tightening of spacing in certain letter pairs (such as *To*). If you have Microsoft Office installed, you can open a Publisher document in Word and use Word's automatic formatting. We found this especially useful for importing plain-text files.

Publisher's primitive table feature supports only static text and numerals, and it can't perform addition. Surprisingly, you can't open a Publisher table in Excel to perform arithmetic, but you can import an Excel spreadsheet into a Publisher document. And although you can't insert graphics into Publisher's table cells, you can

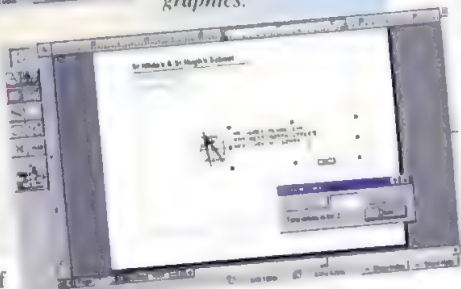
draw a box over a cell and insert the graphic into it.

With Microsoft Office on your system, Publisher lets you open documents in Word for editing. It also shares clip art and other graphics features with Office. Publisher's editing window has standard toolbars for file management and graphics editing, and you can fill much of the window with a large list of help topics and a detailed help index on the toolbar.

Publisher's interface offers more extensive explanations and pop-up tips

◀ FULL FRONTAL:

After creating a Web site, Publisher displays it in your browser with working links. A troubleshooter helps you solve problems related to links and graphics.



than anything in Microsoft Office. The program also pops up an explanatory balloon or dialog box when you first use or ought to use any mildly complex feature, or when you risk creating problems by overlapping graphics or moving one box near another. Happily, these tips gradually stop appearing as you use Publisher, although you can choose to have them continue.

You can also change the mouse pointer to a labeled icon that tells you whether moving the mouse drags or resizes a selected object. Another feature consists of explanations in almost all dialog boxes as to alternate ways of performing a task. You can access most features from the keyboard. But you

have to learn arcane key combinations, such as Shift-F5 for jumping to the next page.

FROM PRINT TO THE WEB

Although Publisher lets you develop fairly sophisticated Web pages, you won't use it in place of a standalone HTML editor if you want to use forms or frames. Basic designs include professional-looking effects—such as overlapping graphics—and framed graphical navigation buttons. Preset backgrounds and colors are available from a dialog box with a preview window; you can create custom combinations of textures and colors, but you can't save them for later use.

You can add dividing lines and e-mail buttons from the gallery of preset designs, and a mouse click lets you replace the graphics inserted by the wizard. An item on the help menu opens a clip-art library from Microsoft's Web site in your browser.

The new mail-merge feature works like that of any advanced word processor. You add replaceable fields to your documents and merge them either with address lists created in Publisher or with any external Access, dBASE, or comma-delimited files. You can sort and filter address lists, but you can't program a merge and reuse it.

Publisher is the only software program that lets the graphically challenged create professionally designed graphics. Nothing else approaches it for visual appeal and ease of use.

Microsoft Publisher 97 CD Deluxe. Street price: \$80. Requires: 8MB RAM, 32MB hard disk space, Microsoft Windows 95 or Windows NT. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; www.microsoft.com. Circle 409 on reader service card.

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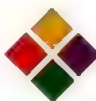
— Windows Magazine, November 1996

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First Looks

INTERNET ACCESS

Tuning In to the Web

Set-top boxes and Net-savvy television accessories deliver the world of the Web to your family for a fraction of the cost of a PC.—By Karen Bannan

The Computer Age is coming to a TV near you. Internet access, in the form of Web-enabled set-top boxes and televisions, is now available at a cost below that of a PC.

More than ten companies are working on Internet-enabled consumer products designed specifically as alternatives to the often-daunting home PC. Net TVs are relatively inexpensive and simple to hook up. Just plug the unit into a wall outlet and a telephone connection and you're online.

The concept is appealing, and at less than \$400, the price is right. But there are some tradeoffs. Although most of the companies have announced plans to ship some type of storage device this year, none of the units that we reviewed could save any files. In addition, processor-hungry Web technologies—such as Java and ActiveX—are not supported. All three units in this roundup, however, are HTML 2.0-compliant, making possible such features as sound, animated .GIFs, and rudimentary multimedia.

To get an overview of this fledgling category, we tested the \$330 Philips Magnavox WebTV, Sega's \$200 Saturn Net Link, and the \$330 Sony WebTV Internet Terminal. Both the Philips Magnavox WebTV and Sony WebTV connect directly to your television and in many respects are almost identical. Both companies license WebTV's online service (www.webtv.net) and use the same software. The Saturn Net Link works in conjunction with Sega's Saturn 32-bit game system, which costs an additional \$199.

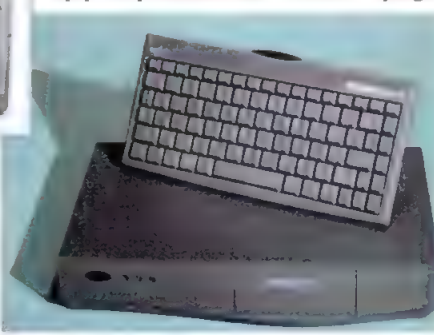
Like cable television and traditional Internet service, Net television service is subscription-based and costs about \$20 a month.

With that, you get browser software and e-mail service, and you can even bookmark favorite sites and set parental controls. The Sony and Philips Magnavox WebTVs also include a family room staple—remote control.

We tested the products on a Panasonic 32-inch television set using a standard telephone hook-up. And because it makes the experience of using Net TVs comparable to that of working with a standalone PC, we used the optional standard-size keyboards.

To determine how these units compare in terms of performance with a PC running Netscape Navigator or Microsoft Internet Explorer, we timed how long it took each system to connect and download several popular Web pages. PC enthusiasts will no doubt grouse about the limitations of a set-top box, but we

were impressed by the quality of these early systems, and using them was a lot of fun. The Net Link is for the gamers among us, and the Philips WebTV won't tie up your phone line. But of the



WEB HQ: The Philips Magnavox WebTV and keyboard bring the Net to your living room.

tion to the family with a single telephone line because of its Lineshare technology (also in the Sony unit), which lets you receive telephone calls while other family members are surfing the Web.

The Philips WebTV features a 33.6-Kbps V.34bis modem and includes a 112-MHz, 64-bit IDT R4640 Orion MIPS RISC processor, and a 44.1-kHz, 16-bit stereo audio output. Once you plug in the box and turn it on, you're prompted to select an e-mail address and enter personal information, including a credit card or checking account number. After you signed up, you're taken to a start page with an options menu that includes several Cool Web sites, Mail, Favorites (bookmarks), Explore, Around Town, and Search.

three, the Sony WebTV is our favorite for its all-around design and performance, and its potential to unlock the Web.

Philips Magnavox Philips Magnavox WebTV

The \$330 Philips Magnavox WebTV will be a welcome addi-

tion to the family with a single telephone line because of its Lineshare technology (also in the Sony unit), which lets you receive telephone calls while other family members are surfing the Web. Explore is a preformatted list of more than a dozen categories that contain popular Web sites, and Around Town takes you to an area that features sites unique to your home town. There's also a link to a setup menu and online instructions for using WebTV.

On our tests, the Philips WebTV was an average performer in terms of download

PERFORMANCE TESTS

Net TVs



To get an idea of how Net TVs compare with traditional PCs, we timed how long it took for several popular Web pages to begin to appear and for the complete pages to download. Actual download times vary significantly depending on your connection speed and the amount of traffic online.

All in all, the Philips Magnavox and Sony

set-top boxes—both of which use the WebTV online service and 33.6-Kbps modems—were faster on our tests than the Sega Saturn Net Link. For comparison, we also timed how long it took to download the same pages on an AcerNote Nuovo 975, a Pentium/166 PC with 32MB of RAM and a 33.6-Kbps modem, running Microsoft Internet Explorer 3.0.

	Microsoft (www.microsoft.com)		Netscape (www.netscape.com)		Excite (www.excite.com)	
	First up	Download complete	First up	Download complete	First up	Download complete
Philips Magnavox WebTV	18	41	10	32	10	21
Sega Saturn Net Link	12	41	13	52	12	49
Sony WebTV	17	33	8	26	8	16
Pentium/166 PC*	6	25	7	28	6	17

* Reported for comparison

speed. It was not as fast as the Sony WebTV, but it outperformed the Net Link, which relies on a 28.8-Kbps modem and lacks the ability to cache pages.

Both the Philips Magnavox and Sony WebTVs are good low-cost alternatives to a multimedia PC for Web browsing, but we gave the Sony unit a slight edge in terms of overall out-of-the-box experience.

Philips Magnavox WebTV. Street price: \$330. Requires: Phone line, television set. Philips Magnavox, Knoxville, TN; 888-813-7069, 423-521-3260; www.philipsmagnavox.com. Circle 413 on reader service card.

Sega of America

Saturn Net Link

Sega's \$200 Saturn Net Link is a video game cartridge that opens up the Web to gamers. For Saturn users, it is the least expensive and easiest route to the Internet.

The Net Link's power comes from the Saturn's three 32-bit RISC processors and two powerful video processor ASICs. Browser software is included on a separate CD that is inserted in the Saturn's double-speed CD player. The browser supports up to 60 characters of text per line and can magnify portions of Web pages to three times their size. The Saturn connects via a V.34 modem with a maximum throughput of 28.8 Kbps.

One of the Net Link's most alluring attributes is its promise of interactive gaming. Sega plans to ship several games that support networked play via the Net Link. The Net Link works with any SMTP- or POP3-compliant mail server, which means you can retrieve e-mail from work or personal accounts.

The first time you connect the Net Link, you're given the option of signing on with Sega's ISP, the Concentric Network, but you can also use the product with your ex-

isting ISP. You always begin your Web journey at Link City on Planet Oasis (www.planetoasis.com), a 20-block Internet city that contains links to more than 225 commercial Web sites.

On our tests, the Net Link loaded pages at speeds similar to the other units'. Since the Saturn does not cache pages, making subsequent visits to a site during the same session is tedious. Graphics looked clean, but they were not as crisp as they appeared on either the Philips or Sony WebTV boxes. Although Net Link does play .AU and .WAV sound files in stereo, the unit lacks support for MPEG and RealAudio sound files.

To move around Web pages, create e-mail, or enter URLs, you can use a Saturn controller, an on-screen keyboard, or the Sega mouse. A translucent tool bar and a pop-up command compass also aid in navigation, and an

adapter allows you to connect any standard PC keyboard to the unit.

Surprisingly, the Sony WebTV's graphics quality was extremely good although not as sharp as that of a PC's display. Image files (.GIFs, JPEGs, and TIFFs) were vibrant, clean, and free of blurring and distortion. On our tests, the Sony unit downloaded and displayed pages faster—often a full

10 to 15 seconds faster—than the competition. Results vary, however, depending on connection

speed and the amount of on-line traffic. But you won't spend a lot of time waiting for downloads, because Sony caches the most popular pages on its Web server.

Both the Sony and Philips Magnavox WebTVs allow you to create as many as five e-mail addresses and accounts for family members via a WebTV Networks subscription. Sending and receiving e-mail is simple. You select the Mail option on the main menu and click on any waiting e-mail to read it. A red light at the top of WebTV alerts you to any unread messages. Like the Philips Magnavox unit, the Sony WebTV has a WebTV Port connector for use with printers, cable modems, and other peripherals. Both the Philips Magnavox and Sony units have a Smart Card slot for online shopping and banking, although at present no applications support these features.

During our testing, a new version of the WebTV software was released for both the Sony and Philips WebTVs. When we logged onto the server, we were notified of the upgrade option, and the upgrade was automatic. The total file transfer took less than 10 minutes and was completely transparent.

We discovered that the new software went a long way toward making the Net TV experience nearly as rich as that of using a PC. Version 1.1 of the WebTV software includes support for RealAudio 2.0 files, background music, and a television set-up menu for optimizing picture and graphics quality.

For a complete Internet experience right out of the box, Sony WebTV fills the bill.

Sony WebTV Internet Terminal. Street price: \$330. Requires: Phone line, television set. Sony Electronics Inc., Park Ridge, NJ; 201-930-1000; www.sel.sony.com. Circle 415 on reader service card.



JUST ADD TV: Along with your television, the Sony WebTV Internet Terminal delivers the Internet.

Sony Electronics Inc.

Sony WebTV Internet Terminal

The newest and probably most complete of these three Net TV offerings, the \$330 Sony WebTV Internet Terminal delivers the Web to your living room.

Sony WebTV features a 33.6-Kbps V.34bis modem, a 112-MHz 64-bit R4640 RISC processor, a custom graphics processor, an ISO Smart Card slot, and an RF adapter. The system also includes a Universal Remote Commander and a comprehensive Internet guidebook—*What's On The Web*—to help your fingers do the browsing. The remote control is for Web navigation and works with most television sets as well.

Surprisingly, the Sony WebTV's graphics quality was extremely good although not as sharp as that of a PC's display. Image files (.GIFs, JPEGs, and TIFFs) were vibrant, clean, and free of blurring and distortion. On our tests, the Sony unit downloaded and displayed pages faster—often a full



GAME EFFORT: Sega's Saturn Net Link integrates a CD-ROM and a keyboard with the Web.

adapter allows you to connect any standard PC keyboard to the unit. Of the three units we reviewed, the Net Link's controller and on-screen keyboard were the easiest to operate, although you'll probably want to use a keyboard.

If you already own a Saturn system, the Net Link is one of the fastest and least expensive





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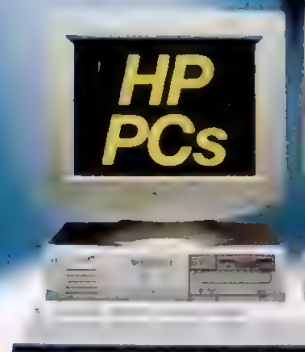
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ILLUSTRATION

Better Performance, More Power

CorelDraw 7 provides a raft of new features, several Web goodies, and a needed performance increase over previous versions. —By Luisa Simone

It's been a long time coming, but CorelDraw 7 Graphics Suite delivers the performance boost that Corel users have been waiting for. Although performance gains grab the spotlight, there are plenty of new features as well, making this \$700 graphics suite (upgrade, \$250) a worthy heir to the CorelDraw crown.

CorelDraw users will notice faster response to most functions, but such complex tasks as applying filters, lens effects, or transparencies to large imported bitmap files still take time. But the performance boost in basic functions, in combination with interface enhancements, allows graphic designers to get more work done in less time.

Many of CorelDraw's new tools let you manipulate an object's formatting attributes directly. For example, you can drag and drop colors from the palette to an object's fill or outline. And new tools let you create blends, gradients, and transparencies interactively. The special gadget boxes that appear when these tools are active give you precise control over effects. Because CorelDraw can now generate variable transparency effects, any fill (gradients, patterns, and fractal textures) can be used as a transparency mask.

FILL 'ER UP

CorelDraw also makes it easier to combine bitmapped and vector elements. For full-featured paint and image-editing functions, you still need Corel PhotoPaint, but CorelDraw now allows you to apply filter effects to imported bitmaps. The program

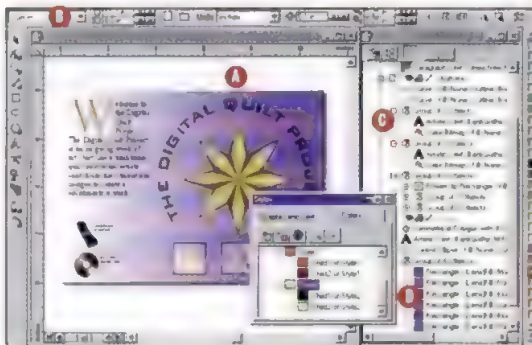
even supports the Adobe plug-in specification for third-party filters. Key image-enhancement filters, such as gamma correction and color adjustment, can be applied to both bitmapped and vector objects, making it easy to correct a drawing globally.

The integration of raster-

ship between a hue and its tints. Subsequent changes to the parent color flow down the chain of related colors making short work of recoloring complex drawings.

Among the first graphics programs to offer integrated color management, CorelDraw employs Kodak CMS and industry-

A PROPERTY LINE: The Property Bar is a context-sensitive toolbar for accessing commonly used functions.



COLOR COORDINATED: Corel's Color Styles detected the parent-child relationship between the golds and the browns in this drawing.

vector objects is exceptionally well implemented. For example, when you rasterize a vector object in CorelDraw, you can automatically generate a transparent background. By contrast, Deneba's Canvas 5.0.1 requires you to apply a clipping path manually (First Looks, February 4, 1997). CorelDraw's interface now has a context-sensitive Property Bar that provides options based on the active tools; this keeps your work area free of roll-up dialog boxes. And you can reorganize just about every aspect of your work space via the Options and Customize dialog boxes.

The Object Manager provides a live, hierarchical view of a document, and you can use it to manage pages, change the stacking order, create groups, and alter object attributes. Color Styles establishes a parent-child relation-

ship between a hue and its tints. A wizard walks you through the configuration process, and you can generate custom profiles of your hardware using either perceptual or instrument calibration.

CorelDraw includes programs, robust utilities, tons of clip art, and a huge selection of fonts. Corel PhotoPaint 7 has been enhanced with an image-sprayer tool that, like Fractal Design Painter's, paints with a series of images. And by giving you controls for output as well as input values for dynamic range, PhotoPaint addresses the issue of press limitations; like CorelDraw, PhotoPaint uses Kodak CMS.

LOGO A-GO-GO

The package also includes Corel Dream 3D and eight utilities. If you regularly use Corel's clip-art collection, you'll love the new

Scrapbook with its drag-and-drop thumbnails. For those who specialize in creating 3-D logos, the point-and-click interface of CorelDepth takes the guesswork out of extrusions. CorelDraw also ships with a selection of third-party filters, including Handmade Software's Image Alchemy, Extensis Corp.'s Intellicolor 2.0, MetaTools' Kai's Power Tools SE, Cytopia Software's PhotoLab, and Digimarc Corp.'s PictureMarc.

CorelDraw and Corel PhotoPaint offer a number of output

C BLOW-BY-BLOW: The Object Manager displays a hierarchical view of the document.

D BACKGROUND CHECK: Corel's intelligent implementation of transparent backgrounds for bitmaps lets you composite images easily.

options for Web graphics, including progressive JPEG, transparent interlaced .GIF, and interlaced .PNG. In addition, PhotoPaint can produce wavelet-compressed files and animated .GIFs, Dream 3D can output VRML, and CorelDraw can export a docu-

ment to HTML or Corel's Java-based Barista format.

Unlike the Find and Replace wizard in Macromedia's Freehand, CorelDraw's is limited to such basic attributes as object type and fill. CorelDraw supports Bitstream's TrueDoc—a font-embedding technology—for normal .CDR documents, but you can't incorporate font outlines into Barista documents. Finally, the synergy between CorelDraw and PhotoPaint doesn't extend to Corel Dream 3D or CorelDepth.

At this point, no other graphics program offers the breadth of features or comprehensive automation capabilities found in CorelDraw 7 Graphics Suite.

CorelDraw 7 Graphics Suite. List price: \$700 (upgrade, \$250). Requires: 32MB RAM, 400MB hard disk space, Microsoft Windows 95 or Windows NT 4.0. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-3733; www.corel.com. Circle 412 on reader service card.

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First Looks

VIDEO

Video Capture Value

Intel's Smart Video Recorder III holds its own against capture boards costing four times as much.—By Jan Ozer

Aggressively priced at \$200, Intel's Smart Video Recorder III is ideal for capturing video, but the board can't perform nonlinear video editing, and it doesn't support PAL or SECAM formats.

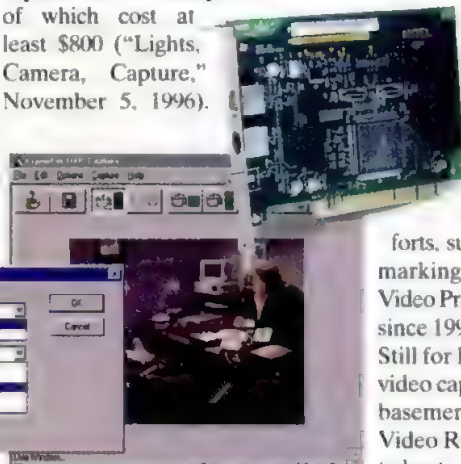
The Smart Video Recorder is a plug-and-play, PCI-bus-master card built around Brooktree's Bt848KPF Video Decoder. The board has composite-video and S-Video input jacks but no video-out ports; it supports only NTSC video. Two Asymetrix programs—Digital Video Producer and Web Publisher—plus composite-video and S-Video cables round out the bundle.

The Smart Video Recorder captures video at any resolution from 32-by-24 to 640-by-480. This flexibility is especially useful when working with nonstandard sizes such as those for Internet

delivery (176 by 144 pixels) or SIF MPEG-1 (352 by 240 pixels). You can choose between two capture formats, raw and compressed. Software controls let you adjust incoming brightness, contrast, saturation, and hue, plus quality levels when you're capturing in compressed format.

We tested the Smart Video Recorder on a Gateway Pentium/133 with 16MB of RAM and a 16-bit, plug-and-play Creative Labs Sound Blaster audio card. At 320-by-240 resolution at 30 frames per second (fps), it produced a data rate of 2.7 megabytes per second (MBps), which the system easily stored to disk without dropping frames. We compressed in three formats: Cinepak, MPEG-1, and VDOLive streaming video

technology. On Cinepak and MPEG-1 tests, the board produced sharp, generally artifact-free video. The results compared quite favorably with the files produced by the four systems tested in our First Looks capture card roundup, all of which cost at least \$800 ("Lights, Camera, Capture," November 5, 1996).



PLAY IT SMART: The Smart Video Recorder III is ideal for capturing video bound for the Internet or a CD-ROM.

More impressive were the VDOLive test results. Because the Smart Video Recorder captures raw video, it avoids

the double-compression artifacts characteristic of Motion JPEG capture cards. We also captured 320-by-240 at 15 fps in compressed mode to test suitability for prototyping. Video appearance was easily sufficient for prototyping and, at higher data rates, suitable for kiosks.

The product is not without its flaws. The capture interface is clunky and offers no creature comforts, such as disk benchmarking utilities. Digital Video Producer, unchanged since 1994, is sorely dated. Still for high-quality, basic video capture at a bargain-basement price, the Smart Video Recorder III is hard to beat.

Smart Video Recorder III. Street price: \$200. Requires: 8MB RAM, 100MB hard

disk space, Microsoft Windows 95. Intel Corp., Santa Clara, CA; 800-536-3373; www.intel.com. Circle 411 on reader service card.

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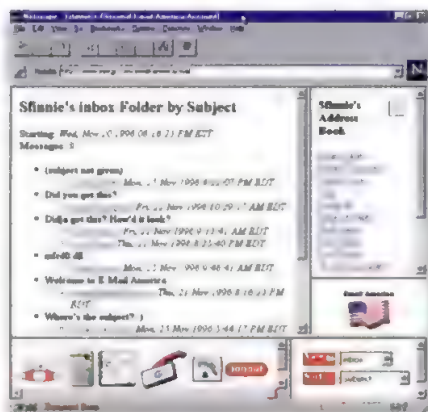
Browser-based e-mail allows you to retrieve and send mail from any Internet-connected PC.—By Scot Finnie

Email America, a \$59.95-a-year, Web-based e-mail system from Inergy, offers users a permanent e-mail address and a permanent mailbox with a password-protected log-on.

Email America is client-, platform-, and Internet provider-independent. With Netscape Navigator or its equivalent, you can access your Email America mailbox to send and receive messages from virtually any computer that's connected to the Internet via any Internet service provider.

The service also offers a full-featured set of e-mail tools, including a user-customizable e-mail address book, one-click message addressing, mailbox

folders for sent and received messages, signatures, MIME attachments, and online help. For most



NO JUNK MAIL: Email America is a full-featured mail client that works inside your Web browser.

users, that's just the right mix of features to keep it simple yet make the service powerful enough to use every day.

This concept is appealing, but we encountered a few problems during testing. Email America is supposed to work with Internet Explorer 3.0, but some features, such as file attachments,

simply don't work with Microsoft's browser. And the way Internet Explorer displayed Email America forms made them tough to work with. Finally, on more than one attempt we were unable to log onto Email America's server, and we noticed occasional service slowdowns. Inergy is working on these problems.

Although Web-based e-mail is a fairly new concept, Email America already faces stiff competition. For example, HotMail (www.hotmail.com), offers equally powerful tools, and there are free HTTP-based e-mail services (First Looks, September 24, 1996). The only drawback to HotMail is that you have to put up with advertisements, just as you do with proprietary free services.

If you object to ads in your inbox, Email America may be worth the money. Otherwise, HotMail can provide the same advantages of Web-based mail without the price tag.

Email America. List price: \$59.95 per year. Requires: Internet access, Netscape Navigator 2.0 or later, or Microsoft Internet Explorer 2.0 or later. Inergy Inc., Cambridge, MA; 888-463-7491, 617-354-1880; www.inergy.com. Circle 410 on reader service card.

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In an independent usability study just completed, Micrografx® FlowCharter™ was easier to learn, easier to use, and up to 100% faster than Visio®. In fact, every single user preferred FlowCharter™ to Visio in these areas. Jeff Schueler, President, Usability Sciences Corp. said, "It is rare to see a product outperform a competitor as significantly as FlowCharter did



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in this study, which focused on working with process flow charts and multipaged diagrams. Users were more productive, more satisfied and preferred Micrografx FlowCharter over Visio by a wide margin." For a summary of the study results and a trial CD, visit www.micrografx.com/getresults or call 1-800-424-9751. (You can even ask Visio for the study. We sent them a copy too).



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First Looks

INFORMATION MANAGERS

Info Overdrive

New versions of ACT! and ECCO Pro focus on workgroups and the Internet—By David Haskin and Nelson H. King.

New versions of two mainstay information managers—Symantec's ACT! and ECCO Pro (recently acquired by NetManage)—extend their workgroup and Internet features and provide levels of information-management flexibility not found in less powerful packages.

Whether you're looking to integrate your workgroup tasks with a contacts database or simply drowning in business cards and other information, one of these packages can organize your life.

Symantec Corp.

ACT!

Most PIMs aren't powerful enough to meet the needs of contact-centric professionals, such as salespeople, but specialized contact-management packages can be difficult to learn. Symantec Corp.'s \$199.95 ACT! 3.0 achieves a nice balance between database power and PIM ease of use.

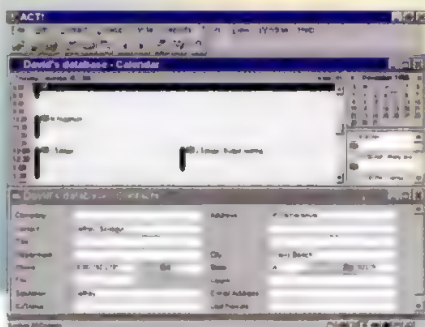
In this upgrade, ACT!'s simplified interface lets you view multiple parts of your database simultaneously. This allows you to drag and drop data from the contact list, for example, to the calendar, so you can schedule appointments quickly. Each contact record now has tabs that display free-form notes and contact histories. Like Janna Contact Personal (First Looks, November 19, 1996), ACT! now makes it easy to attach files to contact information.

Symantec has cleaned up ACT!'s telephony and commu-

nications capabilities. When dialing contacts' phone numbers, ACT! now interacts seamlessly with Microsoft Windows 95's TAPI support, and it supports caller ID. As a bonus, it can serve as a basic client with Microsoft Exchange for Internet e-mail; previously, ACT! supported only cc:Mail, CompuServe, and Microsoft Mail.

ACT! now manages groups of contacts and lets you share

PIM POWER ▶ ECCO Pro crams a lot of information into its PhoneBook and Calendar screens.



databases over a network. This feature is particularly useful when several members of your workgroup deal with the same account.

Workgroups will also benefit from ACT!'s new group-scheduling capabilities. You can quickly check other people's availability when planning a meeting. ACT! automatically changes each person's calendar to show the meeting and sends e-mail notification to attendees. But unlike ECCO Pro, ACT! doesn't have a response mechanism.

ACT! 3.0 still isn't simple to use, but it is easier than most high-end contact managers and about as powerful. If managing your contacts precisely is a matter of professional life and death, ACT! is a lifesaver.—DH

ACT! 3.0. List price: \$199.95. Re-

quires: 8MB RAM, 23MB hard disk space, Microsoft Windows 95, or Windows NT 3.51 or later. Symantec Corp., Cupertino, CA; 800-441-7234, 408-2539600; www.symantec.com. Circle 407 on reader service card.

NetManage Inc.

ECCO Pro

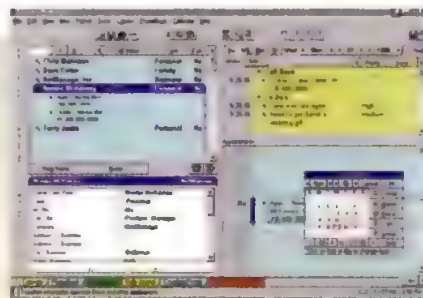
NetManage's \$100 ECCO Pro 4.0 is an information manager with lots of Internet hooks. It has 2,000 bookmarks for existing Web sites and the ability to launch a browser with a single click. Version 4.0 brings the

CrossTies Software's CrossTies for Workgroups and Corel InfoCentral also use this object-based approach, but ECCO Pro offers the best balance of flexibility and ease of use.

In Version 4.0, NetManage builds on ECCO Pro's outline-based metaphor to help organize such Internet-related information as bookmarks. Shooter allows you to transfer notes or URLs to ECCO Pro without leaving the active program. ECCO Pro can even automatically assign incoming data to designated folders.

ECCO Pro easily handles all the basic contact-management

functions and does a good job logging calls and tracking schedules. Contact data is collected in columns that are added to the Phone Book list, but ECCO Pro has upped the ante with a Gantt chart feature on the To Do outline. Although the chart can be useful, it is part of the feature



TIME SHARE ACT! now displays multiple parts of the database at the same time, so you can drag and drop data among them.

Editors' Choice-winning ECCO Pro into the 32-bit Windows world ("Good-Bye, Rolodex! So Long, Sticky Notes!," April 23, 1996).

This Microsoft Windows 95 and Windows NT version supports OLE 2.0 drag and drop, and long filenames, and it delivers improved multitasking performance. ECCO Pro 4.0 also features quick access to NetManage's Chameleon and Z-Mail, and there are new wizards for mail, workgroups, and file synchronization.

With its extensive note-taking capabilities and use of outlines, ECCO Pro has long been a favorite of writers and researchers. You can now drag and drop items from one area of the program to another, organize items within an outline, and then hide or display outlines within customized folders.

creep that clutters ECCO Pro's interface.

Out of the box, ECCO Pro can share data and schedules for a small workgroup. Installation is simple, though depending on the mail system you use, its reliance on e-mail as the communications mechanism may cause complications. For road warriors, Version 4.0 has a file synchronization wizard that helps load your portable PC with data and keep it current with your desktop PC.

If you're looking for power and flexibility, ECCO Pro 4.0 is a great choice.—NK

ECCO Pro 4.0. Street price: \$100. Requires: 8MB RAM (12MB recommended), 16MB hard disk space, Microsoft Windows 95, or Windows NT 3.51 or later. NetManage Inc., Bellevue, WA; 206-885-4272; www.netmanage.com. Circle 408 on reader service card.



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(shown with optional monitor)*

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Cache External	256KB Write Back (optional)	256KB Write Back	256KB
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Expansion Slots/Drive Bays	5/5 Desktop	5/5 Desktop	5/5 Minitower
Ports: Serial/Parallel	1/1 (ECP)	1/1 (ECP)	1/1 (ECP)
Security Features	Yes	Yes	Yes
Processor Upgradable	Yes	Yes	Yes
Software Pre-installed	Windows® 95 or Windows 3.1	Windows 95 or Windows 3.1	Windows NT Workstation on CD-ROM
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Price* (monitor not included)	\$1,139	\$1,679	\$3,419



*All prices shown are Compaq DirectPlus prices and do not include monitors. Reseller prices may vary. Other models available, call for pricing. Call for lease prices. Leasing is provided for a term of 36 months and is subject to approved credit and certain terms and conditions. Call for details. †Deskpro is covered by a Three-Year Limited Warranty. Restrictions and exclusions apply. Some monitors and certain options are covered by a One-Year Limited Warranty. Call for details. Offer available in the U.S. only. © 1996 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo registered U.S. Patent and Trademark Office. Deskpro is a registered trademark and DirectPlus is a registered service mark of Compaq Computer Corporation. Products, prices and programs are subject to change without notice. The Intel Inside Logo, Pentium, and Pentium Pro are registered trademarks and the Pentium Processor Logo is a trademark of Intel Corporation. Windows is a registered trademark of Microsoft Corporation. Other products are trademarks or registered trademarks of their respective companies.

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First Looks

UTILITIES

A Sextet of OS/2 Options

These six OS/2 utilities cover everything from system crashes to spell-checking.—By Esther Schindler

Nobody uses an operating system out of the box, and OS/2 Warp users are no exception. We looked at six of the latest OS/2 utilities that let you customize your PC. They provide a PC crash helmet, personalized weather reports, and more.

PROCESS COMMANDER 1.0

OS/2 Warp is a stable operating system, but a misbehaving application can still cause an occasional crash. Stardock Systems' \$69.95 Process Commander 1.0 enhances OS/2 by increasing system stability, and it provides several tools that keep you from having to hit the power switch.

With Process Commander, you can press Alt-Ctrl-Del to display a text-mode screen showing the system's running processes; with a few keystrokes, you can kill a recalcitrant program and get back to work. Process Commander also provides you with information about your applications, the resources your applications use, and the purpose of each process.

Featuring a host of powerful tools to help deal with system

crashes, Process Commander is an air bag for OS/2. Circle 401 on reader service card.

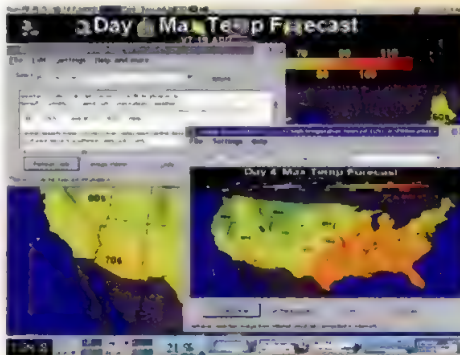
UNIMAIN 5.0

When it comes to cleaning up OS/2, SoftTouch's \$80 UniMaint 5.0 works like a janitor. It lets you uninstall applications, tinker with the .INI files, back up files, and fully maintain your OS/2 system.

OS/2, along with many of its applications, keep .INI files in a binary format instead of in ASCII text. The binary format improves performance, but you can't view or edit .INI files unless you use Uni-

Maint. Version 5.0

STORM SYSTEM:
Element.ary delivers weather reports via the Internet.



also adds wizards, an uninstaller, new tools for managing extended attributes, desktop backup utilities, and a program to build a cross-referenced table of DLLs.

UniMaint is best suited for advanced users who want to get the most out of OS/2. Circle 402 on reader service card.

THE GRAHAM UTILITIES 2.0

The Graham Utilities 2.0 is a comprehensive suite of 76 disk, file, and general utilities designed to extend OS/2's functionality.

The package does just about everything: file undeletes, disk defragmentation (for both FAT and HPFS file systems), directory sorts, disk wipes, and binary-file editing. The suite also includes a modest set of diagnostic utilities and several tools for managing extended attributes. The utilities are text-mode, which makes them quite fast, but we wish there was a GUI version as well.

The Graham Utilities is a worthy addition to the toolkit of any OS/2 user. Circle 403 on reader service card.

QUICKMOTION FOR OS/2

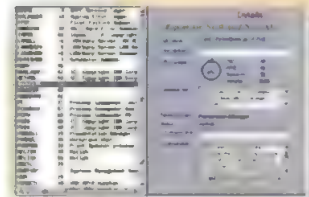
OS/2 lacks native support for QuickTime video. The solution? Practice Corp's QuickMotion for OS/2, which is a \$49.95 multimedia plug-in that makes OS/2 movie-friendly.

With QuickMotion installed, you can play QuickTime .MOV and .QT files as well as Windows .AVI files. On our tests, the sample sound was clear and the video playback smooth.

QuickMotion focuses on one thing and then does it well. Circle 404 on reader service card.

WHAT'S WHERE:

Process Commander shows what programs are running.



ELEMENT.ARY FOR OS/2

BMT Micro's \$34.95 Element.ary for OS/2 can tap into your Internet connection, download regular weather reports, and display the results graphically.

The program can change your desktop background automatically to produce the bitmap weather image, and it uses reports from American Weather Concept's NEXRAD weather prediction system. You can even view weather movies with the built-in MPEG viewer. With a separate shareware package, Element.ary can use BackTalk 1.1—OS/2's text-to-speech application—to read the weather to you.

Element.ary acts like a weather forecaster inside your PC. Circle 405 on reader service card.

SPELLGUARD 1.2

We've come to expect spell-checking in most of the applications we use, but other programs (such as e-mail clients) routinely omit this desirable feature. The \$25 SpellGuard 1.2, also from BMT Micro, looks over your shoulder while you type.

SpellGuard can be as intrusive as you want it to be. You can tell the program to beep, play a .WAV file, or display flashing colors whenever you make a spelling error. And with its 77,000-word dictionary, SpellGuard does a good job of suggesting alternative spellings.

In short, SpellGuard 1.2 is a universal spell-checker with personality. Circle 406 on reader service card.

Product	List price	Requirements	Company	Contact information
Element.ary for OS/2	\$34.95	8MB RAM, 2MB hard disk space OS/2 Warp	BMT Micro Wilmington, NC	800-414-4268 www.btmicro.com
The Graham Utilities 2.0	\$49.00	4MB RAM, 6MB hard disk space, OS/2 Warp	Office Solutions, Long Beach, CA	310-439-5567
Process Commander 1.0	\$69.95	8MB RAM, 4MB hard disk space OS/2 Warp	Stardock Systems, Canton, MI	800-672-2338, 313-453-0328 www.stardock.com
QuickMotion for OS/2	\$49.95	8MB RAM, 1MB hard disk space, OS/2 Warp	Practice Corp., Sunnyvale, CA	www.practice.co.com
SpellGuard 1.2	\$25.00	8MB RAM, 2MB hard disk space OS/2 Warp	BMT Micro Wilmington, NC	800-414-4268, www.btmicro.com
UniMaint 5.0	\$80.00	2MB RAM, 2MB hard disk space, OS/2 Warp 2.1 or later	SoftTouch Systems Inc., Oklahoma City, OK	800-944-3036, 405-947-8080, www.softtouch.com

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Second Looks

DOCUMENT MANAGEMENT

Tomorrow's Graphics Today

In our initial review of Imaging for Windows 95 (First Looks, May 14, 1996), we said that the program represented the future of graphics. In many respects, Imaging for Windows continues to point the way for integrating image and document management at the operating-system level. Some important updates, fixes, and changes to this joint Microsoft/Wang project have brought the future of graphics into clearer focus.

Last spring, Imaging for Windows 95's rich viewing and annotation tools were offset by

Imaging for Windows interface to open it. In Imaging for Windows, however, certain file types—.BMP, for example—open as read-only, and you must save them before making any changes.

All in all, Imaging for Windows presents the user with one of the simplest yet most sophisticated interfaces available in the graphics world. At a glance you're presented with the original document, a thumbnail, and any annotations you've made; there's even a pane for zooming in on specific areas of the document, and you can flip or rotate the image.

In real-world operation, using Imaging for Windows involves a sequence like this: First, you acquire the image of a paper document via Imaging for Windows' 32-bit Twain 1.6 interface (take a look at the list of supported devices on Wang's Web site before you download the program). Next, you can view the file and annotate or mark-up the image using an assortment of tools. Changes—such as cropping marks or captions—are stored in an independent layer. You can then save,

print, e-mail, or fax the resulting document.

Using Imaging for Windows to modify an incoming fax form, we filled in the pertinent information and highlighted an incorrect address. We then e-mailed the results back to the sender, complete with a date stamp—all in about two minutes.

A few glitches remain. First, you can save annotations in a separate layer only if you're using the TIFF 6.0 Multipage format; you need to affix the annotations to the file permanently if you want to save the image as, say, a

.BMP file. Of more concern, you can directly import neither Photo-CD (.PCD) images nor Adobe Acrobat portable document files (.PDFs) with Imaging for Windows, which severely limits its functionality. Finally, there's no undo feature, so all your actions are permanent. Wang is addressing these last two details and adding tighter integration with Office 97 in the next release.

Eventually, Imaging for Windows will be directly incorporated into future versions of Windows 95. In fact, the current version is part of Microsoft's recent OEM Service Release 2, which gives PC vendors the option of including Imaging for Windows with the pre-installed software on new systems.

And a Windows NT version is included with Workstation, Version 4.0. For even more control over scanned and faxed documents, you can upgrade to the \$79 Professional Edition at Wang's Web site. This edition, which should be available by the time you read this, includes Xerox's TextBridge OCR engine, enhanced document management, Internet features, and automation tools.

Imaging for Windows points to the day when working with bitmap images will be as easy as handling text files.

SECOND LOOKS MAILBOX: Tell Second Looks about your experiences with computer products. Contact Brian Nadel via MCI Mail (556-1500), CompuServe (72241,1616), or the Internet (bnadel@zd.com).

BUG BRIEFS

Problem: Several Acer Aspire PCs play some but not all .WAV sound files; the system reports that the files are corrupted and can't be opened.

Solution: The Aspire's default program association for playing .WAV files is Sound Recorder, which may not be able to play all .WAV files. Try using Media Player to play .WAV files instead.

Problem: If you've had trouble using Micron Millennia Transport's NTSC output to display the notebook's screen on a television, your BIOS may need an update.

Solution: Try downloading the latest system BIOS revision. Go to Micron's Web site (www.mei.micron.com) and get TR401104.EXE. The 1MB file contains a new video driver and better synchronization for TV output, and it supports hard disks of 2GB and more.



shortcomings that included poor mouse integration. For example, you couldn't use the mouse to drag and drop items onto or within the program's interface. Based on five ActiveX components, Build 20136B of Imaging for Windows remedies some of the program's early shortcomings and is available free from Wang's Web site (www.wang.com/sbw/iw95form.htm). If you use a modem connection, be prepared to wait; the compressed file occupies more than 2.4MB.

Imaging for Windows catches up with standard Windows programs by allowing you to drag and drop an image or an entire page onto its desktop interface. Like other full-fledged Windows programs, Imaging for Windows even lets you drag the icon of an image from the Windows Explorer onto the



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Web Publishing Teaches New Tricks

Like half a million of my closest friends, I'm publishing a Web site. With luck, it'll be up and running by the time you read this. I'm taking the opportunity to learn new skills and apply my writing to interests other than computers. Building and main-

taining a Web site uses computers and computer skills far more intensively than my workaday word processing does.

The site is called Bill's Best of Everything, and it's my personal guide to the best People, Places, and Things in the known universe. It's an idiosyncratic selection of products, services, unique places, and people. It covers everything from the best female stunt pilot to the best beach sand to the best shaving creams (and the dramatic difference between the top supermarket brand and the top boutique brand). Bill's Best is expanding rapidly, and we'll be adding discussion software so you can mount futile arguments against my expert opinions. Bill's Best is part of ZD Net, but you can reach it directly at www.billsbest.com.

I've spent a lot of time experimenting with HTML editors and site-building software. In my column "Web Power Tools: The Cutting Edge?" (*PC Magazine*, November 5, 1996), I described my early experiences with Microsoft FrontPage and Asymetrix's WebPublisher. Despite the many new products and new versions that have emerged in the past several months, WebPublisher remains the fastest and best way to prototype a site or to manage a simple one.

I've found, however, that getting the control I want over every item on every page requires a powerful HTML editor. So far my favorite is HomeSite, a 32-bit HTML editor written by cartoonist Nick Bradbury, creator of the cartoon strip *Dexter*. Bradbury was frustrated with the tools available to maintain his Dexter site, so he wrote his own, using Borland's Delphi programming language. It's excellent, but it's not WYSIWYG (nor are most of the site-building packages that claim to be). Frankly, I'm glad to trade WYSIWYG for the control I get in HomeSite. It's the best \$25 you'll ever spend on an HTML editor.

My site has lots of photographs, and I'm fussy about image quality. So I've spent a fair amount of time educating myself on image capture and image processing. I've written a couple of columns on digital cameras, but for my purposes, nothing has outperformed the combination of my camcorder and a Snappy image-capture module. Since many photos in

Web-based articles are thumbnails—only 200 pixels square, or even smaller—you may be wondering what the big deal is. I've found the best thumbnails come from sharp, detailed pictures that have at least 640-by-480 resolution with 16 million colors. A large image is easier to manipulate and better for judging color accuracy. And when you resample down to your target size and color depth, you seldom get nasty surprises.

I've been using Corel Photo-Paint 7.0 for most of my image processing, and it has made an appreciable difference in the quality of the images I can get. The Scissors and Magic Wand mask tools are ideal for eliminating backgrounds so that you can float the object you've photographed on a pure white background or superimpose it on another background or color. Photo-Paint, like Adobe Photoshop and JASC's Paint Shop Pro, supports every conceivable color model, so you can choose the one most appropriate for improving your image. Photo-Paint also has a wide variety of image-enhancing filters and 2-D and 3-D effects.

Getting a good image is at least half the battle, and nothing outperforms the Snappy, especially if you already have a camcorder. Yes, you can get better resolution by scanning a photograph onto a 600-dpi scanner or using a high-end digital studio camera, but we're talking \$199 versus big bucks. I made a copy stand for my camcorder out of my old enlarger base, and I use two photoflood bulbs in cheap aluminum reflectors. Your camcorder may

have a great low-light sensitivity spec, but it needs lots of light for the best picture. I preview the image on a color TV.

I've come up with a few tricks, such as "floating" the object on a piece of glass raised several inches above the background. This way, I can angle shadows far away from the object and let Photo-Paint generate a controlled drop shadow. I also use a strongly contrasting background sheet so that the mask utilities can detect the object easily. Some objects look better when photographed on a light table, with light coming from above and below, but color balance can be tricky.

Applied technology in action: As they say, it sure beats working for a living. □



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Communications Breakdown

I've had nothing but trouble with my modem. Every so often it simply stops dead for up to 2 minutes, then resumes working properly. This problem, which has been discussed in trade magazines and Internet newsgroups, involves older versions of the U.S.

Robotics internal Sportster 33.6 fax modems. I own one posing as a Gateway TelePath 33.6 Data/14.4 Fax. (Tip: You can uncover your own modem brand by using the new diagnostic program that comes with AOL 3.0—check it out.) Anyway, Gateway and other vendors have used Sportster modems as their own in many PCs.

U.S. Robotics says it will provide an update to customers who run into problems if the simple patch (outlined below) fails to correct the problem. But what I find most troubling is that few people have complained about it. They don't even seem to notice. When I talked to Gateway I was told, "Nobody has complained." I believe it, because I'm convinced that when it comes to telecommunications most people are clueless. If the session hangs for a minute or two, it must be the service's fault. Darn CompuServe!

I've also discussed this problem with U.S. Robotics reps, and they seemed nonplussed and said they would send a new modem. They claimed the pauses occur only in terminal mode during online chats. Actually, there's evidence, based on my own experience and from what I've read on various newsgroups, that the modem sticks all the time. It's just more obvious during terminal mode since you are communicating in real time. Here is a simple fix that can be useful for any adjustments you need to make to modem settings. If your modem still doesn't work, you can fill out a form on U.S. Robotics' Web site requesting a chip update or a new modem.

See the Sportster Supervisory Update Information page in the site's troubleshooting section (www.usrobotics.com).

In your terminal program or in the setup of online services such as AOL, you can add the S12=0 parameter to the modem initialization string. But for systems that use Windows 95's Dial-Up Networking utility, you must patch Windows in order to set this parameter properly. The patch is added through a back door, of which there are many in Windows 95. Open My Computer and then open the Dial-Up Networking folder. Right-click on the icon for the connection you're using and select Properties. Click on the Configure tab and again on the Connection tab. Then click

on Advanced, where you'll find an option called Extra Settings. Here, you can add extra AT commands to your modem for any Windows telecommunications activity. Add S12=0 and close all dialog boxes.

Once I made this fix, the modem immediately stopped hanging. The S12 register apparently contains a delay loop that activates if the modem thinks something other than data transmission is going on. If the modem thinks a voice call or a fax is in progress, for example, it pauses to see if this other function is continuous. Trouble is, line noise also seems to trigger this action. By setting the S12 register to 0, you can essentially disable this feature, and the modem will chirp along without delay. Personally, I don't need to worry about permitting applications to interrupt my data transmission, although I suppose some users may utilize this feature.

The point is, the modem can be easily fixed. But how many people would know it needs to be fixed in the first place, and how many in that group could find the Extra Settings box buried in Windows? Not many, I suspect, since the instructions are hidden on page 808 of the Windows 95 Resource Kit Documentation.

This experience tells me two things. First of all, with all the modems out there and all the things you can do with a modem by changing parameters via powerful AT commands, there's a market for a telecom-friendly OS or management utility that simplifies modem

settings. The fact that Microsoft buried these features so deeply proves to me once again that Windows is not a telecommunications-savvy OS. Second, it's obvious the public is having trouble keeping up with the increasingly complex telecommunications technology. Some of this is our fault: The computer press is not helping people sufficiently to see through smoke and mirrors. Worst of all, people have come to accept these so-called minor glitches, assuming they are simply par for the course when it comes to computer products. Repeated system crashes, flaky software, and incompatible hardware, I believe, have all lowered people's expectations. This isn't good.



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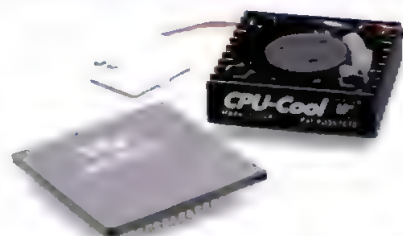
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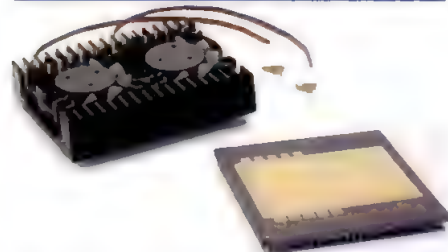


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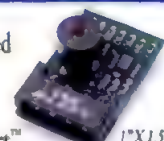
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Inside Track

Strange Bedfellows Dept.: Look for faster memory subsystems in the years ahead. Intel has hopped in the sack with Rambus Corp. to develop a 1.6-gigabyte-per-second DRAM interface for PCs. Since Intel is talking about a 1999 time frame, we can assume this is being designed to be part of the architecture for its millennium machine, which is based on the P7 chip and is currently under development with Hewlett-Packard. Intel makes most of the motherboards on the market, so there should be no trouble getting a new standard in place without the aid of committees or a consensus. Apparently, this Rambus memory architecture has much more potential than the current synchronous DRAM design.

Meanwhile, Intel has been showing off what it says is the **most powerful computer in the world**. Capable of doing more than 1 trillion operations per second, the machine was built for the Department of Energy, which buys these things in a vain attempt to create a model for controlled nuclear fusion as well as to simulate H-bombs and weather patterns. (It reminds me of the joke about the computer that can predict the weather: "It can predict tomorrow's weather with 100-percent accuracy. Problem is, it takes two days to run the calculation.") The \$55 million machine consists of **9,200 Pentium Pro chips**. It also makes one heck of a coffee warmer. I wonder how fast it runs Wordstar?

Whither NT?: More good news for Intel. Alternative platforms appear to be dwindling into the **niche markets** from whence they came. Last year, all the platforms were looking toward Microsoft Windows NT as a booster rocket to stardom. But by year's end, they all had given up the ghost. In December, the last few hold outs, **IBM and Motorola, gave up on Windows NT** for the PowerPC platform. In fact, IBM pretty much gave up on anything running on the PowerPC except AIX, IBM's Unix clone. A few years ago, IBM was working on the **now-defunct Workplace OS**, the overhyped killer OS that never saw the light of day. Now, the IBM PowerPC is just another Unix platform. Unix über Alles.

Digital Equipment Corp.'s **Alpha** is the only remaining non-Intel Windows NT microprocessor. Windows NT was originally designed as a "portable OS/2" that would reduce Microsoft's reliance on Intel. That plan seems to have fallen through the cracks, and you have to wonder how long it will be before **Windows NT is optimized for Intel**, and Digital is left in the lurch.

What's Going On with Cable Modems? Dept.: There was a big hubbub at the recent Western Cable Show, where the Multimedia Cable Networks System (MCNS) coalition unveiled the specifications for its Data Over Cable

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interface—the so-called standardized cable modem. The specification is so loose, it's suspected no standard modem could actually be built. Meanwhile, two other standards group, the IEEE and the Digital Audio Visual Council (DAVIC) are about to introduce specifications too. Currently, no two brands of cable modem are interoperable. Since when are such incompatibilities important to the cable companies anyway? The point of these things is to create a network connection to the cable host only, so **who cares if the modems aren't interoperable?** Just use one brand on one cable system.

While the modem scene shakes out, I've noticed an interesting move by Time Warner. Conventional wisdom is that the set-top box is dead, but apparently Time Warner sees gold in them thar hills and has announced intentions to buy **1 million set-top box units** for its cable subscribers. At first, I didn't understand this, until I saw the specifications for the new set-top box: They include Internet access and **Web browsing capability**.

Apparently, the WebTV device has sold so well (believe it or not) that Time Warner cable sees an opportunity to get into the Internet business and to get people into **interactive TV**. The real reason for interactive TV, by the way, is to **better profile you as a viewer** (that is, to spy on you) so that providers can give you specialized commercials. That's why, as many times as we reject it, broadcast companies keep trying to shove interactive TV down the public's throat.

Gates and the Browser Dept.: I'm fascinated by **Microsoft's Internet strategy**. The company continues to promote MSN on and off and is now talking about surpassing CompuServe to become the number-two online service, behind AOL. But I'm not convinced that the company is sincere about any of it. With this in mind, I try to read between the lines whenever Gates makes a pronouncement regarding the Web. Here are some examples from a mini-interview with Gates:

Regarding the future Microsoft OS whose interface is modeled after a browser's, Gates says, "We see browsing as a feature of the operating system. . .but now that the operating system has hyperlinking and browsing built in, local storage and the Web will be transparent to you, **except for speed.**" This last comment was very interesting. This says to me that Microsoft is going to integrate the browser into the OS to demonstrate that the personal/desktop side of computing is fast, and that the network/Web side of computing is slow. Since the biggest trend in computing has been that toward speed, this comparison will hopefully **trivialize or even kill the Web**. Extremely wishful thinking by Microsoft, methinks. Or perhaps I'm reading too much into this? □

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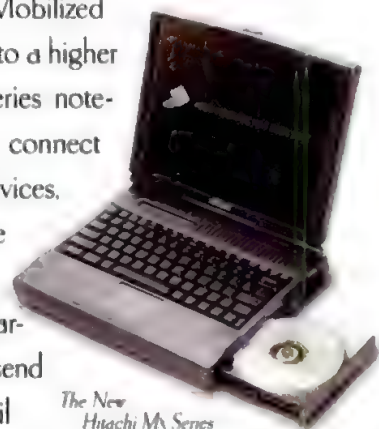
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When Okay Is More than Good Enough

Question: When is merely okay pretty good and just so-so more than good enough? Answer: In PC-based desktop videoconferencing. This isn't a riddle, and I'm not playing games. Though I am tough on products and have high expectations for

how they should perform, for years I've been using desktop videoconferencing systems that are rarely better than just okay, and that have often been—and in some cases remain—mediocre. Yet I go on using them.

Although I long for the days when big-screen videoconferencing with sharp images, accurate color at normal light levels, and high framing rates will be easily attained through plain old telephone service, I don't *kvetch* much anymore about how bad a lot of the point-to-point desktop videoconferencing I do is. I just sit back and enjoy it.

I'm far from alone. PC-based desktop videoconferencing has its uses, if mainly outside business hours. And a heck of a lot of people are getting value out of it, its limitations notwithstanding.

In the early days of the PC business, Adam Osborne, developer of the quirky Osborne 1 suitcase-style portable PC (now resting in peace), argued that to become successful, PC products didn't need to be great—merely *adequate*. It set my teeth on edge when Osborne went on about that, but the success of his product and of hundreds more “adequates” since then has proved him right: They may not have been terribly good, even for their times, but they worked, they delivered a lot of value, and you and I scooped 'em up.

At *PC Magazine*, we're devoted to the importance of finding technically excellent products, and I subscribe to that view. But I also know that you and I often choose less-than-excellent tools for reasons of economy or availability or because of the modest purposes to which the tools are being put. I certainly don't want to deter videoconferencing hardware and (mainly) software developers from driving toward the big improvements we need for this stuff to make sense for use on a broader scale, but I don't want readers to miss out on a tool they'd find helpful.

In the wide range of videoconferences I participate in—from the elaborate PictureTel videoconferencing rooms on down—my favorite system is about as primitive as they come: a golf-ball-size Connectix Color QuickCam camera running White Pine's wonderful Enhanced CU-SeeMe soft-

ware. You probably know some of the story behind this combination. The Connectix camera evolved from an earlier black-and-white camera first produced for the Macintosh community, where it became a huge hit; the CU-SeeMe software was first developed at Cornell University and then licensed to White Pine for further development and commercial release.

Why do I like this combination so much? Because it lets me talk to my family when I'm on the road. I have become addicted to these little bedtime videoconferences with Dad off in Somewhere, as my five-year-old says.

It couldn't be easier. I have a QuickCam set up with the CU-SeeMe software on the family PC in our home. I carry a second one with my notebook PC. Most nights when I'm traveling—when the time zone doesn't sabotage me—I “call home” on the Connectix/CU-SeeMe rig for a quick visit with my wife and son.

Audio quality? So-so. Video quality? A grainy, smallish, limited-color-palette image, with that jerky look that means you're running at well under 30 frames per second.

Know what? We don't care a bit.

We see each other, tell jokes, make faces, look at drawings we've made. We tell stories about the people with whom we've been during the day. We *communicate*. Dirt cheap. Almost effortlessly.

Sure, if you compare that notebook and QuickCam with a big CRT display hooked up to a great Sony video camera

and a PC that's connected to the other end of the conversation via a T1 line—and if the PC and camera at the other end were also of top quality, of course—we'd see a difference. A *big* difference. But I could never haul that rig around with me. Besides, by now we kinda like the video artifacts and low frame rate; my son and I get to play “the missing fingers” game by sweeping a hand back and forth in front of the camera so fast that much of the motion falls between captured frames, and the hand appears oddly formed.

Almost as good as the Connectix/White Pine combo is the Vivitar Motion Picture Phone 2 color camera bundled with Smith Micro Software's really excellent AudioPhone



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desktop video-
conferencing
has its uses—
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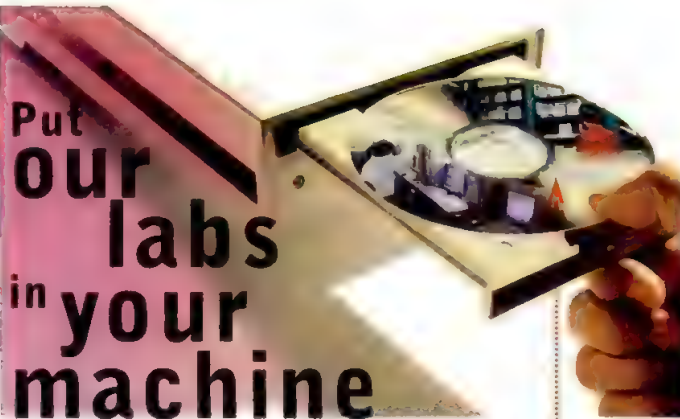
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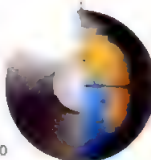
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program. Same size, same idea, same price (about \$300); works well.

An important footnote: With either system, make sure your notebook PC accepts an external keyboard. Both cameras connect through parallel ports but also require a keyboard jack for power. Some ultralightweight notebooks have dropped that keyboard connection to save weight and space.

When the cost, size, weight, and complexity gaps between useful low-end products and the much better big-iron setups are wide, PC users tend to look more carefully at the *results* rather than the technology. And to decide that okay is actually pretty good. And even that so-so is more than good enough.

No matter how much we may love high-end products that reek of technical excellence, sometimes the small, cheap tool that delivers satisfactory results quickly and easily proves to be a great choice.

Hot tip: There's hardly a category of PC utilities duller than screen-capture software, and the notion of a really excellent screen-cap utility is almost an oxymoron. With so many screen-grabbers available today—many of which work perfectly well—why rave about just one? Because one actually does stand head and shoulders over the others.

TechSmith's SnagIt/32 does everything you'd expect a screen-cap program to do, and does it well—everything from giving you a choice of file-save formats to completing auto-naming/auto-numbering sequential screen-snaps without your intervention and giving you a wide choice of captured-area options.

So far, so good, but nothing exceptional.

The feature that will win your heart, especially in the Web era, is AutoScroll. A major use today for screen-grabbers is capturing Web screens. But often a Web page is more than one screenful of information; it may well be stacked two, three, or five screens high. Normal screen-cap programs can't handle that.

SnagIt/32 handles the problem of capturing the part of a Web (or other) page that's presently off-screen elegantly. With AutoScroll selected, SnagIt/32 grabs not only the part of the page you can actually see but also everything that lies below it, off the bottom of your screen.

For me, SnagIt quickly became one of my few truly indispensable utilities. You can download a dual-pack 16-bit/32-bit SnagIt evaluation copy of the new version, 3.2, for free from www.techsmith.com; registration is just \$39.95 or, for a ten-user site license, \$200. □

PCs Are Paying Off

I can see the light at the end of the tunnel. Finally, we're almost to the point where virtually *everyone* agrees the PC has become a tool that boosts productivity in your business and personal life, a tool that really and truly helps you do more. I've been a true

believer for about a year now. Don't get me wrong—the frustrations are still there. Oh boy, are they there. But they don't detract from the PC's ability to help you get the job done. Some examples:

The road warrior. I travel a week or more each month, and I've carried notebook computers since 1985 in order to write reviews and to stay in touch via e-mail. (In fact, I'm writing this column from the road.) With a Pentium notebook with a Super VGA display, I can function about as well on the road as in the office: stories, memos, even color page proofs for correction and approval move across the country almost effortlessly via e-mail.

The always-connected, in-building nomad. Even when I'm in the office, for much of the day I'm not at my desk. Like many members of our notebook-toting senior staff, I stay connected at all times via a wireless LAN adapter. Being able to carry a notebook computer into meetings means we can take better, more detailed, and more legible notes. One of the biggest barriers to group consensus has been that people walk out of meetings with different understandings of what the group agreed to do, and meeting summaries aren't distributed for days after, if at all. This way, when we take electronic notes, a meeting summary and a memorandum of understanding can go out right away.

The home user. In many families, education titles are so good, kids prefer the computer to the TV set. And there's enough accessible information on the Internet and on CD-ROM encyclopedias for kids not to be bound by the hours of the public library for doing research. Home business users have enough affordable computing power for there to be no disadvantage relative to the office worker.

The e-mail culture. Paper mail is expensive and time-consuming to send. E-mail is cheap and easy. And among many business users, there's no negative connotation to sending e-mail instead of paper mail. E-mail is a classic "brain amplifier," because one smart person can be even more productive. (Conversely, the nitwit who has nothing important to say can also send out more electronic memos

than paper ones and slow down the whole operation, especially when he or she discovers clip art.)

More intelligent software. Ten years ago, we would have called this "artificial intelligence." Whatever you call it, it's smart enough to help you avoid mistakes and catch some of the

ones you do make. Microsoft seems to be leading the way here. Microsoft Publisher is a first-class product for designing brochures and newsletters; if you follow the recommendations, it's hard to louse up. For instance, there's a color-picker feature that aligns complementary colors in vertical columns. (Sort of like the label on the back of a cheap tie that says, "Wear this with brown, green, or beige suits.") Similarly, the grammar-checker in Microsoft Office 97 can help even a good writer.

Lots of other frustrations have virtually disappeared. Windows is easier to use: drag-and-drop is neat, and long file names are helpful. I haven't lost data to a disk crash in years and, for that matter, I can think of only a few failures recently on any hardware component. Plug and play for installing new add-in cards works the majority of the time. I don't spend much time worrying about finding a driver for each and every application I run.

What remains difficult is *quantifying* productivity gains. How does the CIO show the CEO that an investment in, say, Pentium Pro/200s with 64MB RAM running Windows NT will help the bottom line? Try this: Look back over the past decade and think about what would have

happened to your company had it resisted technology or bought the cheapest technology available and then tried to keep it going for four to five years. Now project that forward. How effective would your field sales force be in 1997 running 486 laptops with 300MB hard disks? In three years, even the Pentium/200s are going to be too slow. Step one in keeping your staff productive is keeping their equipment up to date.

Some studies peg the five-year cost of owning a business PC at over \$40,000. Though these numbers don't allow for the value of productivity gains, the point is clear: The cost of the hardware is insignificant when your company is staying productive and competitive. □



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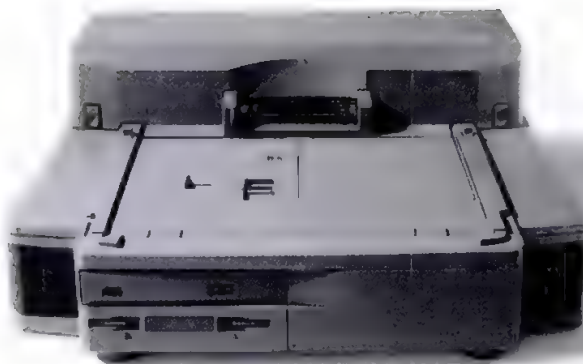
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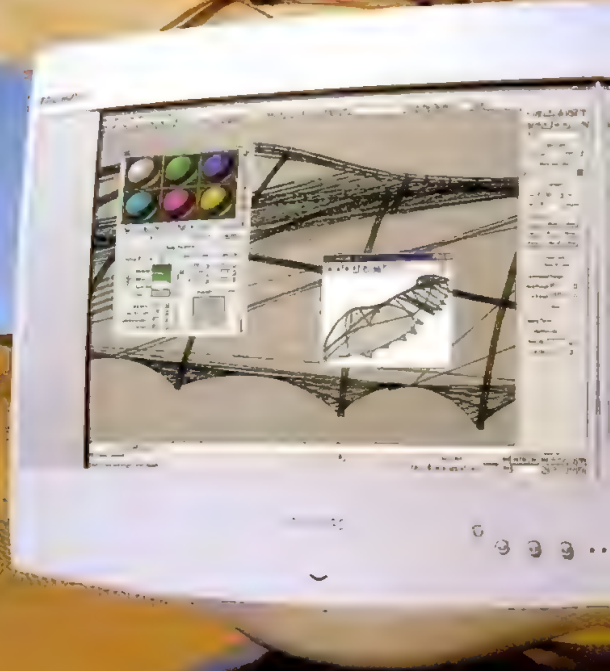
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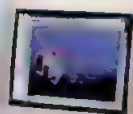
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Web Sites

By Karen Bannan

The Web has experienced such exponential growth in such a short period of time that it has become an essential resource for everything from breaking news to

research, from software to shopping. The pervasive presence of URL addresses on advertisements, magazines, and

products means that you have more sites to choose from every day. *PC Magazine's* editors have put in the hours examining thousands of Web sites to determine which offer the most compelling mix of content, creative design, and cutting-edge technology. We've divided the sites into five categories for your perusal: Commerce, Computing, Entertainment, News, and Reference. We've also included 20 additional sites in 7 categories that represent the core technologies of the Web. If you haven't started taking advantage of the Web's riches, here's the best way to start.

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Egghead Software

WWW.EGGHEAD.COM

You would expect a chain like Egghead to have a strong site, and you won't be disappointed. Pick the software or hardware category that interests you, view a comparative chart of products in that category, read descriptions, link to relevant reviews from computer magazines, and then buy online (with SSL security), or fax or call your order in. No muss, no fuss; just an efficient, online shopping experience for your computer needs.

FAO Schwarz

WWW.FAOSCHWARZ.COM

The ultimate toy store has gone virtual, and the results are as bright and exciting as a child's smile on Christmas morning. The site features online shopping in 15 categories including Barbie, Action Figures, and Stuffed Animals. Each item



highlighted online includes a picture and a short description, and the prices are fairly competitive. There's also an interesting About FAO Schwarz section that outlines the company's history and some of its inventive in-store promotions. As you browse and add items to your shopping cart, you'll find yourself getting caught up in the magic of childhood, over and over again.

Firefly

WWW.FIREFLY.COM

At one of the Web's most inventive sites, you answer a questionnaire about your musical tastes. Cite which artists you like and you get back a list of other artists you might like. You can do the same thing for movies, too, which makes Firefly a great place to visit before you go to the video store. While all that sounds easy enough, what's really going on behind the scenes is "collaborative filtering." You are

Look It Up

Excite

WWW.EXCITE.COM

A powerful search engine, personalized self-modifying information delivery, and a slew of Web site reviews from a competent editorial staff add up to a Web search tool that's more than worth your time.

HotBot

WWW.HOTBOT.COM

With a claimed full-text index of about 54 million documents and an array of powerful filtering tools, HotBot is one of the most comprehensive search engines on the Web.

Yahoo!

WWW.YAHOO.COM

A master Web site directory organized into 14 broad categories, Yahoo! was the first and remains one of the best search sites on the Web today.

Our Contributors: KAREN BANNAN is a staff writer for PC Magazine Online. DAVID LIDSKY was the associate editor in charge of this story, and JAY MUNRO was the project leader.

JC Penney

WWW.JCPENNEY.COM

JC Penney has been a shopping staple for more than 90 years and holds the honor of being the fourth-largest department store in America. Now, the retailer is heading onto the Web so you can shop for sneakers and jeans while sitting in your birthday suit. The site is extensive and boasts links where you can purchase gift certificates and baskets, clothes, housewares, or anything else you'd find in the store. Also, as an online shopper, you can take advantage of daily sales, coupons, and discounts. You can shop for others using the store's gift registry, find your nearest store location, and read about JC Penney's salon and photography centers.

Joe Boxer

WWW.JOEBOXER.COM

Joe Boxer was the first marketing/PR Web sites in existence and is still one of the best. This funky underwear maven proudly proclaims that it's already up to Version 6.9—a testament to the inventiveness of the site, which greets you with games, humor, and a virtual playground. The site succeeds because it makes you laugh and feel good about the company, and then you go out and buy the underwear. See how that works?

Levi's

WWW.LEVI.COM

Levi's successful home page defines the words *hip* and *young*, two things almost everyone wants to be. You can check out Levi's TV commercials, play game versions of the fantasy Pool Boy ad, view an interactive time line, and even peruse a denim dictionary. What's more,



you can finally see all 501 reasons to live in your Levi's in one place. As we said, pretty hip.

Microsoft Expedia

WWW.EXPEDIA.MSN.COM

Expedia, a free service that's also a part of the new Microsoft Network, is an awesome travel planner with features and an interface that have left other, more firmly established travel sites scrambling to catch up. From 360-degree panoramic views of cities to e-mail notification of airfare price



changes on reservations you've made, Expedia has become the travel site to beat. Within 15 minutes, you can book a cheap airfare, search for the perfect hotel, see its location on a map, rent a car, and print out the whole itinerary. It may be time to say bye-bye to your travel agent.

Microsoft Investor

WWW.INVESTOR.MSN.COM

Like Expedia, Investor is a free service that's also part of the new Microsoft Network. With a state-of-the-art interface that lets you track your portfolio, read news pertaining to the stocks you hold, look up historical performance of stocks and mutual funds, and tailor the charts and graphs to your specifications, Investor has all the bases covered. You can also make stock trades via Charles Schwab, with more brokers on the way.

MovieLink

WWW.777FILM.COM

What movie should we see tonight? At MovieLink, not only do you get the typical array of movie news, gossip, and previews, you also get 777-FILM, the online cousin of MovieFone.

Learn HTML

How Do They Do That with HTML?

www.Nashville.net/~earl/htmlguide/

Like a magician revealing the secrets behind his best illusions, this page provides how-tos and links to information on some basic and some not-so-basic HTML tricks.

The HTML Reference Guide

www.sandia.gov/sci_compute/html_ref.html

Sponsored and maintained by The Sandia National Laboratories, this site provides extensive documentation and relevant links to the background, writing and using of HTML.

The Revised Intro to HTML

borg.lib.vt.edu/reports/soasis-slides/HTML-Intro.html

This step-by-step guide teaches you the ins and outs of HTML authoring, including the newest tags, proprietary extensions, and HTML+.

After selecting a city, you can browse by theater, title, or genre and get complete and current movie times. You can chat with other patrons, read reviews, and

777-FILM

even access a Parents' Rating Guide to help you pick the right movie to see with the kids. Once you've made the big decision, tickets are just a few mouse clicks away, and they'll be waiting for you at the theater. Sorry, but you'll still have to wait on line for the popcorn.

Quote.Com

WWW.QUOTE.COM

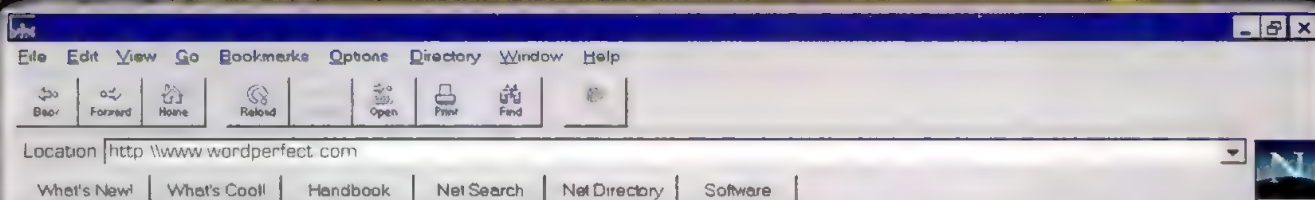
With the stock market proving to be as volatile as a real bull, smart

Industry.Net

WWW.INDUSTRY.NET

You can think of Industry.net as a high-end interactive business resource. This site is effectively a virtual Business-to-Business yellow pages—one of the best places for a business to connect with other businesses and find anything and everything it might need to succeed. You can search the database by product/service or company, and read about the latest industry news. And if you're interested in networking, you can easily scan through the associations and communities link.

Corel Leaps Ahead of Microsoft in Java™ Publishing!



Industry experts are calling Java™ the wave of the future. At Corel, the future is now. Advanced Corel Barista™ technology, an integral part of Corel® WordPerfect® Suite 7 and Corel® Office Professional 7, takes full advantage of Java—an initiative that's left the competition behind. Even the upcoming Microsoft® Office 97 won't offer this breakthrough technology.



Java™—Breaking the Boundaries of Traditional HTML Publishing

Java Language Output Using Corel Barista™ Technology - Corel WordPerfect Suite 7 and Corel Office Professional 7 are the first office suites that allow you to publish to the Java Language from core applications—Corel WordPerfect 7, Corel® Quattro® Pro 7 and Corel® Presentations™ 7.



Advanced Web Publishing Capability - Publish impeccably formatted documents directly to the Web from all core applications keeping all text, graphics and formatting intact. Create columns, build tables and wrap text around images in your documents and publish to Corel Barista—what you see is really what you get!

Powerful Graphics - Tap into the power of the world's best illustration software with the CorelDRAW™ 6 illustration module included in Corel Office Professional 7.

Virus Free† - Steer clear of the recently identified Microsoft® Word macro viruses. With Corel WordPerfect Suite 7 and Corel Office Professional 7, it's safe to share documents with your co-workers.

Corel's Office Suites Provide:

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✓ **Advanced Web publishing**

✓ **Powerful graphics**



Corel has today what Microsoft doesn't, and won't, even in its upcoming release of Microsoft Office 97. Corel WordPerfect Suite 7 and Corel Office Professional 7—software on the cutting edge of innovation—meeting tomorrow's office needs today.

†Source: WordPerfect For Windows Magazine, November 1996, p. 21

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forecasts and reports, market analyses, annual reports, and company profiles. You can also track multiple portfolios automatically and receive relevant real-time news and stock-price alarm notification via e-mail. Onlive!s real-time voice chat, Talker, and information on money-market, CD, mortgage, and credit-market rates from BanxQuote have made Quote.com a viable competitor to getting your own Bloomberg terminal. Although most of the services—including real-time stock quotes—are fee-based, enough free data is available to keep everyone happy.

Tunes.com

WWW.TUNES.COM

Here's another CD shopping site, but unlike CDNow, this one puts its music where its mouth is. You search among 200,000 albums and 1 million song titles to find the disk you want to buy, but before you make your purchase, you can listen to a 30-second



snippet of every song on the album. While you're at it, set up a personal music lover's profile and meet other Tunes members who share your interests, and browse through the personal music picks of the rich and famous.

Computing

C|Net

WWW.CNET.COM

c|net online is a splashy, well-designed site rich with information on computing and on life in the digital age. Updated daily with everything from breaking technology news to product reviews to musings of the digerati, c|net livens up its colorful



content with multimedia elements such as Java applets, RealAudio streams, and Shockwave animations. c|net also produces shareware.com, a "virtual software library" where you can search through a claimed 190,000 shareware titles and their detailed reviews, and search.com, a convenient one-stop front end for dozens of major and minor search engines. The site also boasts gamecenter.com, with reviews and news for the video and PC game-addicted.

Dell

WWW.DELL.COM

Dell has one of the most extensive sites of any PC vendor, but what really sets it apart is its nifty Customize/Buy Online feature, a natural extension of Dell's mail-order roots. Now you can run a price check on a variety of desktop, portable, or server system configurations and, when you've found your dream machine, purchase it online. Of course, Dell doesn't neglect the basics: You can research various product lines, download patches and new drivers, find out about upgrade options, use an automated tech-support expert system, and even check your order status online.

Family Tree Maker

WWW.FAMILYTREE MAKER.COM

Genealogy is the perfect hobby for the Web; it demands excellent research tools and far-reaching communication. Broderbund has neatly integrated the latest version (3.4) of its popular Family Tree Maker package with a Web site that is quickly becoming an important clearinghouse for genealogical research. You can post requests for information or search through the information that others have already posted. There isn't much raw data here yet (you still have to buy the Family Tree Maker CDs to dive in), but as a jumping-off point, it can't be beat.

Gamelan

WWW.GAMELAN.COM

Got a craving for Java? EarthWeb's Gamelan is sure to satisfy it, with listings of over 4,300 Java applets and Java-related sites, including Castanet channels (see the Castanet review in this issue). Whether you're a Java developer or you just want to see some cool implementations of the technology that is changing the way we view the Web, Gamelan is the place to go. You'll find categorized lists of Java implementations, plus What's New and What's Cool sections to make your searches easier. A brief summary explains each applet or site so you can weed out the losers. You can also read about and find sites and information on ActiveX and VRML. Once you're through browsing, you can talk over a cup of Java with other visitors in a chat area.

Gateway 2000

WWW.GW2K.COM

Would you or someone you love like to be kissed by a cow? Gateway 2000 proves that computer company Web sites can be fun as well as

useful. The playfully designed site—built around a bovine theme inspired by the company's mascot—offers easy access to product specifications, information on BIOS and driver upgrades, technical tips, and the opportunity to get cyber-kissed by a Gateway cow. Even better, the company is one of a handful of vendors that actually let you configure, purchase, and check on the status of your system online.

HotWired

WWW.NETWIRE.COM

Wired magazine on the Web is as fresh and visually challenging as the print version of the digital



culture bible. HotWired delivers gossip with Ned Brinard's weekly Flux column, politics with the

Shock Your Site

Macromedia

WWW.MACOMEDIA.COM/
shockwave

Go directly to the source for Shockwave info, updates, cool sites, games, and the Web's largest Shockwave gallery.

Madeleine's Mind

WWW.MADMIND.COM

This full-blown weekly serial chronicles the adventures of a young woman named Madeleine, complete with animation, sound, and music powered by Director files.

Pop Rocket's
Shockwave Game Arena

WWW.POPROCKET.COM/
welcome.html

Choose from a selection of simplistic but clever Shockwave-powered games that you play inside your browser window.

prickly Netizen section, and Industry updates in WebMonkey. Hang out at HotWired's speakeasy, Cocktail, and of course, take a look at back issues of *Wired*. You can chat about what you see or anything else anywhere on the site using talk.com, HotWired's Java-based chat facility.

IBM

WWW.IBM.COM

IBM has assembled all of its product, research, and sales information on this site, which will help you do everything from keeping up with IBM research innovations to getting the latest Aptiva home PC. (You'll still have to visit www.lotus.com for complete information on Lotus products, though.) The site offers a lot of information on OS/2 Warp, but if Warp is not your main interest, you can use the site to find everything from profiles of IBM executives to regular polls in the company's Computers and Society section.

Inquiry.com

WWW.INQUIRY.COM

A resource for programmers and IT professionals looking for an easy way to gather information and reviews about programming and applications development tools, networking, and general technical product information, Inquiry.com is extremely info-rich and well orga-



nized. It offers everything from articles from over 20 leading trade publications to experts providing answers to your specific questions. You'll find that searching for answers to any tech question is fast and easy. (Softbank, the parent company of both *PC Magazine* and Ziff-Davis Publishing, is an investor in Inquiry.com.)

Microsoft

WWW.MICROSOFT.COM

You can't say Bill Gates does anything halfway. Microsoft's site offers computer junkies a bit of everything—actually, quite a bit of everything, and the site's repository is growing larger daily. You can learn all about the company's products, get corporate financial reports and stock updates, figure out how to order ISDN, browse technical-support libraries, learn



to tackle tricky programming issues, and check out technology demos. Further, you can download free copies of software, such as the Microsoft Internet Explorer 3.0 browser and the latest ActiveX controls.

MIT Media Lab

WWW.MEDIA.MIT.EDU

To enter the MIT Media Lab is to find yourself with a visitor's pass to the most famous cyberspace think tank. Browse around and you'll encounter lists of intriguing Internet research projects and cool new online gadgets like a Java-based poker game. Everybody who's anybody in the sphere of deep thinking about the online world's future eventually puts in an appearance here.

Nerd World

WWW.NERDWorld.COM

Nerd World Internet Subject Index and Search Engine makes it easier for you to search for pages that exactly match what you're looking for, especially for computer-related topics. The site features 23 leisure and knowledge categories. Browsing through the Computer category will yield several hundred subcategories on subjects as diverse as Hacking, Power PCs, and Privacy in the Computer Age. Each of the subcategories features extensive, hyperlinked, alphabetized lists with several descriptive sentences, so you know

exactly what you're in for. The page is maintained by a WebBot and updated weekly. Nerd World also has a first-rate People Search engine, a Make Your Own Index link that helps track the site's ten most popular links, and a free classified ad section.

Netscape

WWW.NETSCAPE.COM

Netscape's prime attraction has always been the free software—it seems as if you can always check out a new beta version of the browser or some cool plug-ins with which to play. But you'll also find industry news; Developers Edge, a fantastic fee-based subsite devoted to developer information; Destinations, a launchpad to the best of the Web; documentation on Netscape products and technologies and on the Internet in general; and even a General Store, where you can buy Netscape products that are no longer free.



Sandy Bay Software's PC Webopaedia

WWW.SANDYBAY.COM/

PC-WEB/INDEX.HTML

Fuzzy logic, CD-ROM, domain name, firewall. Are you one of the plugged-in who know what these words mean? Or are you among those who might be slightly behind the technology jargon curve? Or, better yet, someone who feigns knowledge lest his ignorance be known? In any instance, the PC Webopaedia may be just the fix you need. The site is devoted to definitions of popular and obscure computer-related terminology. Search the database by topic or word and in no time at all you'll be spouting techno-babble with the best of them.

Stroud's CWS Apps List

WWW.STROUD.COM

Looking for a hard-to-find utility? Not sure which plug-ins are the best? Stroud's Consummate

Winsock Apps List catalogs hundreds of Windows-based utilities and Internet tools, offering ratings (and often full reviews) in addition to such information as version numbers, file sizes, required operating systems, and prices. You can scan the top 25 downloads of the past two weeks, flip through every 16- or 32-bit application, or check out the latest releases. Everything is presented in an easy-to-scan, table-based design. The site is updated nearly every day, so it manages to stay remarkably current, despite the ever-changing nature of the Net.

Sun Microsystems

WWW.SUN.COM

The Java technology pioneered by Sun has had an even bigger influence on Webmasters' imaginations and on many of today's hottest and coolest Web pages. Keep abreast with the latest news and breakthroughs in the effort to make platform-independence a reality. And who can forget that Sun hardware still



lurks behind the scenes at many of the Web's most popular spots? You'll find not just hardware speeds and feeds but extensive lists of practical tips and tricks to help you keep a site running at its peak.

SupportHelp.com

WWW.SUPPORTHELP.COM

Got a problem with your scanner or your serial bus but lost your manual and don't know the customer-service hot-line number? Get thee to SupportHelp.com, where you'll find links to company home pages, technical-support sites, phone numbers, and e- and snail-mail addresses for over 2,500 vendors. You can search alphabetically or you can check whether a Usenet newsgroup exists to help you, too.



TUCOWS

WWW.TUCOWS.COM

The Ultimate Collection of Winsock Software site offers exhaustive lists of Winsock-compliant freeware and shareware for Windows 3.1 and Windows 95, plus Macintosh software for those die-hard Mac fans. You can browse by application type or by product name; for each tool, TUCOWS offers a version number and revision date, file size and location, price, brief description, and 1- to 5-cow rating. If you're



dying to know when the newest version of your favorite utility arrives, you can subscribe to a mailing list that will keep you apprised of updates. And with more than 100 mirror sites on nearly every continent, you'll never have to worry about waiting forever for something to download.

Tuneup.com

WWW.TUNEUP.COM

This is a smart idea: Provide Internet users access to the latest in drivers, antivirus software, computer publications, DLLs, disk optimization, automatic file storage and retrieval, and driver updates, and give users experts' answers to questions about PCs. Put it all together and package it at a cut-rate price (\$3.95 a month) and you've got one hot power users' Web site.



WebPagesThatSuck

WWW.WEBPAGESTHATSUCK.COM

Often, the best way to make sure you're doing the right thing is to examine the wrong thing. More to the point, to appreciate the good, first you must delve into the bad. Vincent Flanders, the site's author, provides links to bad page after bad page in a quest to show

you how NOT to design a Web page. You'll find that this fun collection of don'ts adds up to a do. Each link is accompanied by an extensive description of why the page is a no-no and what could be done to make it better. Topics include the pitfalls of too many Photoshop images, Just Say No to PageMill, and Those Damn Frames!

webreference.com

WWW.WEBREFERENCE.COM

Only a handful of sites fall under the "it's a must-read for the Web population" heading, and webreference is one of them. From newbie to Webmaster, you'll find plenty of topics to get you started on creating content and to take you into the next century. You'll never want for new information, with extensive coverage on topics such as Web authoring and Java implementation. There's a Developer's Corner a JavaScript Tip of the Week, as well as plenty of job postings for anyone looking to work in a Web-related field. Internet lovers will think they've died and gone to heaven.

w3C Reference Library

WWW.W3.ORG/PUB/WWW/LIBRARY/

Another clear case for content over design, the w3C Reference Library (Libwww) is a general-purpose Web API written in C. It can be used as the code base for writing Web clients, servers, and proxies. Libwww provides reference code for HTTP and other Internet protocols as well as for handling many media types, including HTML. Members have access to new versions a month before the general public does, so you may want to see if your organization is already a part of the consortium.

Your Personal Net

WWW.YPN.COM

YPN is less a search site and more a TV Guide for the Web; this site lists live events that will be happening all across the Web and on

online services in addition to offering a searchable database of over 70,000 Web site reviews.



There's no need to wade through a river of uninteresting garbage here: You can personalize the site to get a really good view of what's new on the Web that's interesting to you.

ZD Net

WWW.ZDNET.COM

ZD Net offers the vast computing information resources of more than a dozen Ziff-Davis computer magazines and newspapers (including *PC Magazine*). The site's NetBuyer section helps you shop



for and purchase the latest products and also access weekly specials and side-by-side comparisons that can't be beat. You'll find daily breaking news, analyses, product and game reviews by the thousand, a huge shareware library, and unique online-only content from several writers and columnists. Whether you're job hunting or looking for the latest trade-show information, ZD Net successfully strives to deliver one of the best technology fixes on the Internet.

Entertainment

Buzznet

WWW.BUZZNET.COM

Like a visit to the cappuccino bar, Buzznet gets your pulse racing and sets your nerves on edge as it serves up the latest jolt of trendy news, features, and pop culture in the form of JetPack, the latest e-zine to hit the Web. Whether you're scanning the latest hot-rod story or breezing through the Happy Mutant Handbook, you're sure to feel invigorated and slightly challenged. Buzznet is a must-read for the trendy on the Web.

(which includes information on wheelchair access, parking, prix fixe and pretheater menus, smoking rules, delivery/take-out, private rooms and catering, outdoor dining, and, if you can believe it, much more). If you want to share your favorite watering hole with the rest of the Internet community, you pass it along to DineNet's owners via a toll-free number.

Discovery Channel Online

WWW.DISCOVERY.COM

The Discovery Channel Online is livelier than an encyclopedia but just as jam-packed with information about everything under the sun. The site, which is more whimsical than the TV channel, lets you

DineNet Menus Online

WWW.MENUSONLINE.COM

DineNet Menus Online is a fabulous guide to restaurants in Atlanta, Boston, Chicago, Dallas, Houston, Los Angeles, Miami, New Orleans, New York, Philadelphia, San Francisco, and the D.C./Baltimore area. The reviews, photos, and menus (with prices) make this a useful site indeed, while the clean interface makes it a breeze to use and simple to search. You can browse each city's restaurants by location, cuisine, or "amenities"



interact with its stories and even customize the site, but it never departs from its educational mission—whether dealing with jazz,



sharks, or technology. The information is so well compiled you can successfully do real research, especially with Knapsack, its personal Web search tool. It's more than just another educational site; it's a net for the amazing stories happening around the world every day. A must for your kids.

Electric Minds

WWW.MINDS.COM

Think of it as the Well on the Web. Cyberspace guru Howard Rheingold is pushing the envelope with a site designed to facilitate serious, wide-ranging discussions about techno-culture, life on the Internet, and the future. He's assem-



bled a crack team of opinion makers and experts and invented an interface that makes participation in the discussions particularly compelling. (Softbank, the parent company of both *PC Magazine* and Ziff-Davis Publishing, is an investor in Electric Minds.)

Entertainment Drive

WWW.EDRIVE.COM

A laughing Geoffrey Holder welcomes you as you begin to explore the multilevel menus of this rich source for show business news and fun. eDrive is a crossover hit from CompuServe, where it has a million members, and there's a definite emphasis here on chat and user interactivity. eDrive isn't a replacement for Mr. Showbiz or El



Online, but it's certainly one of the show-busiest of the showbiz sites.

El Online

WWW.EONLINE.COM

Mr. Showbiz finally has some competition. Downtown Julie Brown, the



host of El's "Gossip Show," is just one of the personalities you'll find at El Online, the Web version of the cable channel. This frequently updated site includes great columns by Ben Stein, catty gossip from Ted Casablanca, plenty of celebrity profiles, and discussion forums—including one where average Joes write in to describe their own celebrity encounters.

Epicurious

WWW.EPICURIOUS.COM

This site, which is updated daily, combines the best of *Gourmet* and *Bon Appetit* with the massive travel archives of *Condé Nast*



Traveler.

The result:

the Web's best site for gourmet recipes and glamorous travel. The searchable databases—both for recipes and for travel—are unbeatable, and original articles and recipes are included to keep up your interest level.

Other features include reader polls,

a What's New at My Farmer's Market section, a wine guide, a restaurant guide sorted by city, and an interactive food dictionary.

Happy Puppy Game Site

HAPPYPUPPY.COM

If your hand is permanently attached to your video game controller, you'll be a happy puppy when you check out this site. Happy Puppy has games, games, stuff about games, and more games.

You'll find games for every type of system imaginable: PC, Macintosh, MUDs, and MOOs, 16-, 32-, and 64-bit game systems. You'll also find a collection of the best cheat/walk-through pages, screen savers, gaming news, information on multiplayer online gaming, up-to-date game stats, and most important, all the shareware you can download.

Internet Movie Database

WWW.IMDB.COM

With information on 80,000 movies, a 1,000,000-entry filmography, and listings of hundreds of thousands of actors, actresses, and crew members, the IMDB is the single best film resource on the Web. You can search it for anything and you won't be disappointed. Not all movies have plot descriptions included, but if you ever need to get a list of something like all of Bette Davis's leading men from 1935 to 1945, or the exact musical score of *Some Like It Hot*, this is the place to find it.

Kids' World

WWW.KIDSWORLD.COM

Leave it to the funmeisters at 7th Level to come up with a site devoted to fun and games for the 8-and-above crowd. Kids' World requires some downloading, but the result is a graphics- and animation-rich site that runs independent of a browser and prevents youngsters from surfing outside its bounds. Join the club officially (for a price) and you'll get four 7th Level CD-ROMs a year.



Even if you don't pay, your kids will still be treated to a wild and wacky fun house that will keep them busy for hours.

Match.com

WWW.MATCH.COM

Hate the bar scene? Loathe all the singles your mom keeps trying to set you up with? Take a chance on the personals—the Web personals. Match.com is the ultimate meeting and greeting, dating and mating site. You can enter as a guest or as a member (for a \$7.95 monthly charge) and peruse your way through postings from the lovelorn of the Cyber Age. Once you find someone you like, you can e-mail that person and set up a date, virtual or otherwise. The site even features an e-zine devoted to dating, relationships, gifts, and Match.com success stories.

Find an Old Friend

Bigfoot

WWW.BIGFOOT.COM

An e-mail-address finder, Bigfoot offers security features and the opportunity to keep the same e-mail address for life.

Switchboard

WWW.SWITCHBOARD.COM

For volume of returns, nothing beats Switchboard, a phone and mailing-address directory.

WhoWhere?

WWW.WHOWHERE.COM

WhoWhere?, the most popular white pages service on the Web, provides an excellent index of personal Web pages, Internet yellow pages, and e-mail addresses.

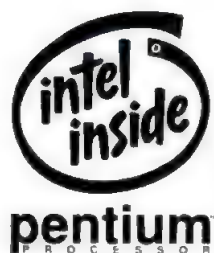
THE REVIEWS ARE IN...

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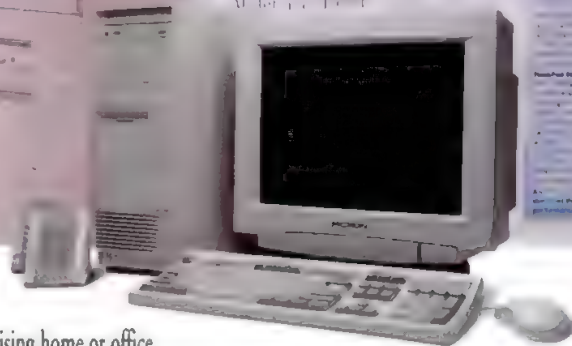
Introducing the MILLENNIA™ MXE AND TRANSPORT™ XPE

Micron now offers exciting new desktop and notebook
solutions that incorporate the advanced MMX™
performance-enhancing technology.
(see configs for details)



REVIEW A New Millennium

Micron's Millennium Pro
Flies High With 200MHz
Of Pentium Pro Power



INTRODUCING THE NEXT MILLENNIA™

The Millennium MXE and the TransPort XPE are the perfect systems for uncompromising home or office PC users. Significantly faster than classic Pentium® processor-based systems, the Millennium MXE and TransPort XPE improve your productivity. Integrating Micron's proven Millennium desktop design and TransPort notebook design with the advanced MMX™ technology from Intel, these new advanced systems dramatically accelerate the performance and enhance the quality of existing and emerging multimedia and communication software. Call Micron Electronics™ today to order your new Millennium MXE desktop or TransPort XPE notebook and get the advanced technology that takes computing to a new level of performance.

ADVANCED DESKTOP SOLUTIONS

Millennia™ MXE P166

With Intel 166MHz Pentium processor with MMX

model 100

INTEL 166MHz PENTIUM® PROCESSOR WITH MMX™

- 512KB pipeline burst cache, flash BIOS
- 12X EIDE CD-ROM drive, 3.5" floppy drive
- 100MB Iomega® Zip™ drive
- Sound Blaster® 32 WaveTable 3D stereo sound card with speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO RAM
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows® 95 & MS® Plus! CD
- Multimedia Xcitement Pak: Adobe® PhotoDeluxe, Pod®, Eraser Turnabout, Blockbuster Entertainment Guide™ & Billboard Music Guide™
- 5-year/3-year Micron Power warranty

- 16MB EDO RAM
- 1.6GB EIDE hard drive
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft Works 95 CD

\$1,999
Bus. lease \$68/mo.

- 32MB EDO RAM
- 2.5GB EIDE hard drive
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft Office CDs

\$2,299
Bus. lease \$78/mo.

- 64MB EDO RAM
- 3.1GB EIDE hard drive
- 17" Micron 17FGx, 26dp (15.8" display)
- Microsoft Office CDs

\$2,899
Bus. lease \$91/mo.

Millennia™ MXE P200 Plus

With Intel 166MHz Pentium processor with MMX

model 100

INTEL 200MHz PENTIUM® PROCESSOR WITH MMX™

- 512KB pipeline burst cache, flash BIOS
- PCI 32-bit Ultra SCSI Fast-20 controller
- 12X SCSI CD-ROM drive, 3.5" floppy drive
- 100MB Iomega Zip™ drive
- Sound Blaster 32 WaveTable 3D stereo sound card with speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO RAM
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 & MS Plus! CD
- Multimedia Xcitement Pak: Adobe PhotoDeluxe, Pod, Eraser Turnabout, Blockbuster Entertainment Guide & Billboard Music Guide
- 5-year/3-year Micron Power warranty

- 16MB EDO RAM
- 2GB Ultra SCSI hard drive
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft Works 95 CD

\$2,899
Bus. lease \$99/mo.

- 32MB EDO RAM
- 4GB Ultra SCSI hard drive
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft Office CDs

\$3,399
Bus. lease \$116/mo.

- 64MB EDO RAM
- 9GB Fast SCSI-2 hard drive
- 17" Micron 17FGx, 26dp (15.8" display)
- Microsoft Office CDs

\$4,999
Bus. lease \$170/mo.

ECONOMICAL DESKTOP SOLUTIONS

Millennia™ LXA P166

With Intel 166MHz Pentium processor

model 100

INTEL 166MHz PENTIUM® PROCESSOR

- 512KB pipeline burst cache, flash BIOS
- 12X EIDE CD-ROM drive, 3.5" floppy drive
- PCI 64-bit 3D video, MPEG, 2MB EDO RAM
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows® 95 & MS® Plus! CD
- Microsoft Works 95 CD
- 5-year/3-year Micron Power warranty

- 16MB EDO RAM
- 1.6GB EIDE hard drive
- 15" Micron 15FGx, 28dp (13.7" display)

\$1,699
Bus. lease \$58/mo.

- 32MB EDO RAM
- 2.5GB EIDE hard drive
- 17" Micron 17FGx, 26dp (15.8" display)

\$2,199
Bus. lease \$75/mo.



A New Millennium

Micron's Millennium Pro
Flies High With 200MHz
Of Pentium Pro Power

37



Core of 130



Hewlett Packard LaserJet 6P

55



Outstanding Performance—Don't Take Our Word for It.

Talk is cheap when you're speaking for yourself. But when it's from the mouth of an industry expert, it carries weight. Here are a few of many examples of what they're saying about Micron PCs:

- | | | |
|------------------------------|---|--------------------------|
| Micron Home MPC™ | "... the fastest we've ever tested ... as well as a marvelous family package ... it wins our Top Rated award ..." | —Family PC, May 1996 |
| Micron Millennium™ | "In short, Micron covers all the bases with this Best Buy" | —PC World, March 1996 |
| Micron Millennium TransPort™ | "... nearly a dead ringer for IBM's ThinkPad ... but performs better and saves you about \$2,500." | —PC Magazine, April 1996 |

The Right System for You

Micron makes a suite of outstanding solutions designed for the way you work or play. From exciting home systems to custom servers, superior desktop PCs to exceptional portable multimedia solutions, Micron always comes through with a system built to satisfy. For details and prices, turn the page.

MICRON[™]
ELECTRONICS, INC.



November 1995
Multimedia Pro2-500 Plus



June 24, 1996
Millennia P1100



June 25, 1996
Millennia P1133



April, 1996
Millennia TransPort™ P1133



December 1995
Best Desktop Computer



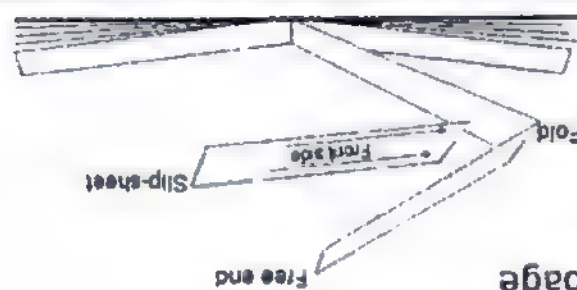
October 1995
Best Desktop Computer



December 1995
Best Multimedia

800-707-2329

<http://www.mei.micron.com>



1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Inverted Foldout slip-sheet

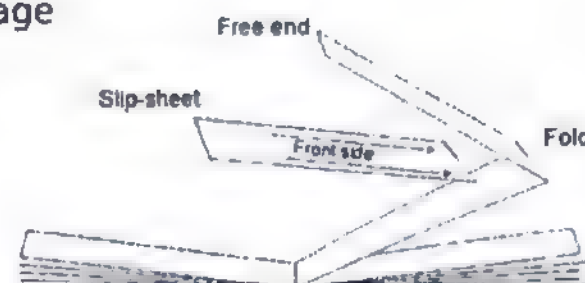


GbsSlipSheet-001

Folded edge of the page

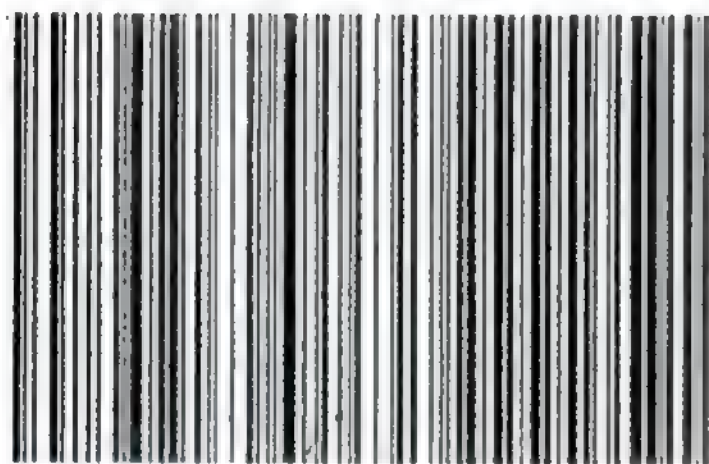
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

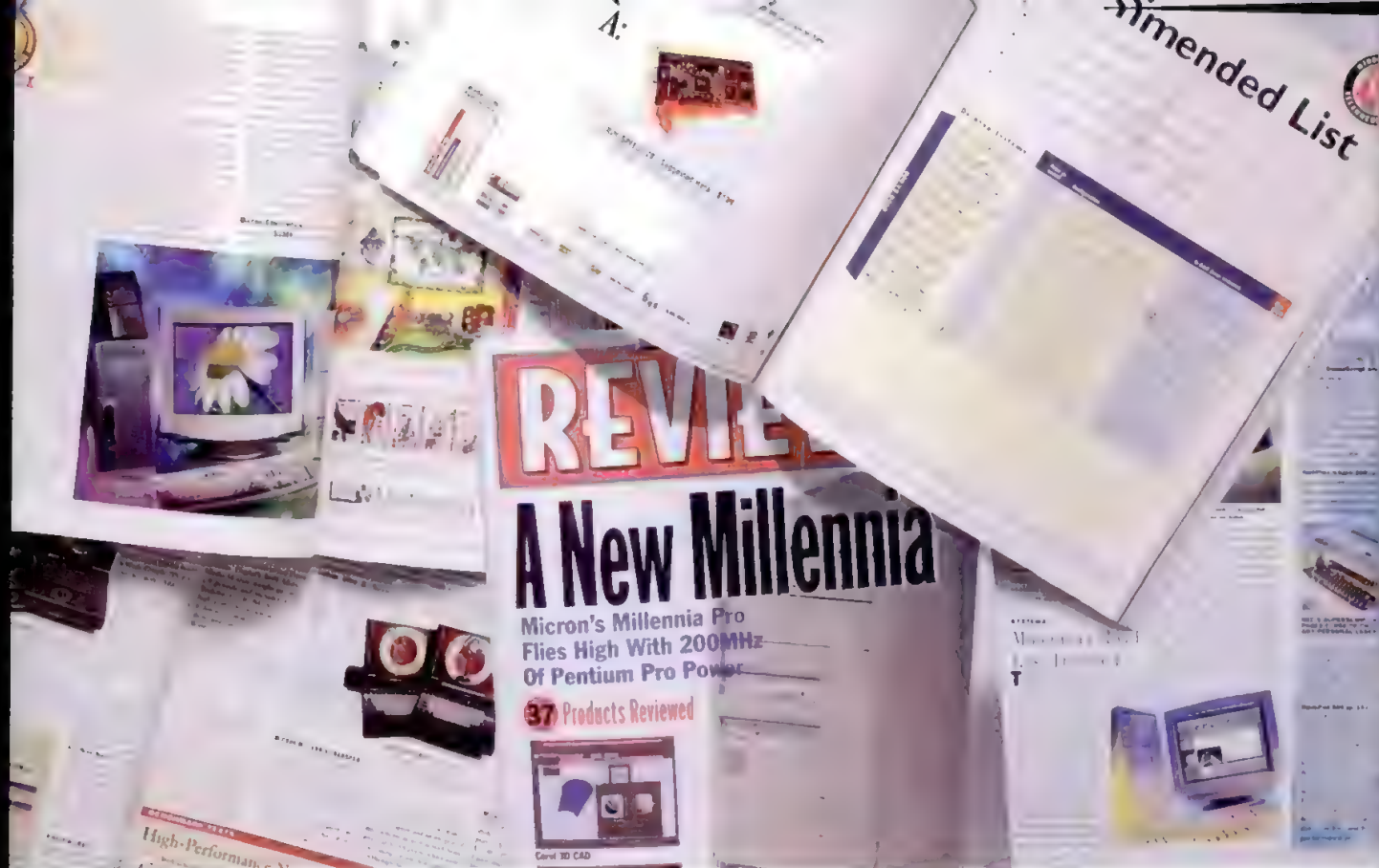
Inverted Back



GbsSlipBack-0018

Back

1. Follow instructions on the other side



DISCOVER FOR YOURSELF WHY MICRON KEEPS RECEIVING ACCLAIM.



Any PC maker can claim to offer a solution that covers your needs. But at Micron Electronics™, we prefer to let our history and our products speak for themselves. We think you'll agree it's an impressive story.

Superior Manufacturing—A Micron Tradition

Micron builds PCs with a legacy of excellence. Our manufacturing processes grew out of nearly two decades in the semiconductor business, where precision is measured in millionths of an inch, and quality in parts per million. We've built strategic relationships with companies like Intel, Microsoft and Novell. From this solid background, we're forging unbeatable systems you can count on today and tomorrow.

Award-Winning Products

In the past two years, leading industry publications have applauded Micron PCs with close to 200 awards for product performance, customer service and support. This includes *PC Magazine's* Best Products of 1995 and Editors' Choice awards in several categories. Add 50 *PC World* Best Buy awards and you've got an impressive technology hall of fame.

Recognized Service and Reliability

After your purchase, the story continues. Just ask *PC Magazine* readers. They bestowed on us the coveted Readers' Choice for Customer Service and Reliability in 1994 and 1995. And *PC World* readers recently rated Micron the best overall PC company for reliability and service in 1996.

Micron PowerSM Warranty—An Industry First

We support our reliability promise with the industry-leading Micron Power warranty. It backs the microprocessor and main memory for five years, an industry first. Add a three-year, parts-only system warranty and a 30-day money-back guarantee, and you can rest assured that you're in good hands.

POWER DESKTOP SOLUTIONS

Millennia™ Pro2 180

INTEL 180MHz PENTIUM® PRO PROCESSOR

- Supports dual Intel 180MHz Pentium Pro processors
- 256KB internal L2 cache, flash BIOS
- 12X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO RAM
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows® 95 & MS® Plus! CD
- 5-year/3-year Micron Power™ warranty

With dual Intel 180MHz Pentium Pro processor add \$399
With Microsoft Windows NT® Workstation 4.0 CD add \$99
*Second processor requires Microsoft Windows NT Workstation 4.0

- 16MB EDO RAM
- 2.5GB EIDE hard drive
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft Works 95 CD

\$2,199
Bus. lease \$75/mo

- 32MB EDO RAM
- 3.1GB EIDE hard drive
- 17" Micron 17FGx, 28dp (15.8" display)
- Microsoft Office CDs

\$2,699
Bus. lease \$92/mo

Millennia™ Pro2 400 Plus

DUAL INTEL 200MHz PENTIUM® PRO PROCESSORS

- 256KB internal L2 cache, flash BIOS
- PCI 32-bit Ultra SCSI Fast-20 controller
- 12X SCSI CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- PCI 64-bit 3D video, MPEG, 4MB EDO RAM
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows NT Workstation 4.0 CD
- Microsoft Office CDs
- 5-year/3-year Micron Power warranty

- 32MB EDO RAM
- 2GB Ultra SCSI hard drive
- 15" Micron 15FGx, 28dp (13.7" display)

\$3,899
Bus. lease \$133/mo

- 64MB EDO RAM
- 4GB Ultra SCSI hard drive
- 17" Micron 17FGx, 28dp (15.8" display)

\$4,799
Bus. lease \$162/mo

- 128MB EDO RAM
- 9GB Fast SCSI-2 hard drive
- 21" Micron 21FGx, 28dp (20.0" display)

\$6,999
Bus. lease \$220/mo

EXCITING HOME SOLUTIONS

Home MPC™ P166

INTEL 166MHz PENTIUM® PROCESSOR

- 512KB pipeline burst cache, flash BIOS
- 16MB EDO RAM
- 1.6GB EIDE hard drive
- 12X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit stereo sound & speakers
- 33.6 fax/modem, speakerphone, voice mail
- Microsoft® Phone telephony software
- Internet ready: SPRYNET™ Internet trial membership, Microsoft Internet Explorer™ 3.0
- America Online® & CompuServe™ trial memberships
- PCI 64-bit 3D video, MPEG, 2MB EDO RAM
- 15" Micron 15FGx, 28dp (13.7" display)

- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows® 95 & MS® Plus! CD
- Microsoft Works 4.0 CD
- Quicken® Financial Pak includes: Quicken Deluxe 6.0, Quicken Financial Planner™, Quicken Parents' Guide to Money™, Quicken Family Lawyer™ and Free TurboTax™ 1996 coupon
- Family Pak includes: ABC by Dr. Seuss, Thinkin' Things™ Collection 1, Earthworm Jim™ and MechWarrior™ 2
- Microsoft Home Pak includes: Publisher Deluxe, Encarta™ Encyclopedia, Monster Truck Madness™ and CD sampler
- 5-year/3-year Micron Power™ warranty

\$1,999

Home MPC™ P200

INTEL 200MHz PENTIUM® PROCESSOR

- 512KB pipeline burst cache, flash BIOS
- 32MB EDO RAM
- 2.5GB EIDE hard drive
- 12X EIDE CD-ROM drive, 3.5" floppy drive
- 16-bit 3D Wavetable stereo sound card
- Advent® AV270 2x25 watt stereo speakers
- 33.6 fax/modem, speakerphone, voice mail
- Microsoft Phone telephony software
- Internet ready: SPRYNET Internet trial membership, Microsoft Internet Explorer 3.0
- America Online & CompuServe trial memberships
- PCI 64-bit 3D video, MPEG, 2MB EDO RAM

- 17" Micron 17FGx, 28dp (15.8" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 & MS Plus! CD
- Microsoft Office CDs
- Quicken Financial Pak includes: Quicken Deluxe 6.0, Quicken Financial Planner, Quicken Parents' Guide to Money, Quicken Family Lawyer and Free TurboTax 1996 coupon
- Family Pak includes: ABC by Dr. Seuss, Thinkin' Things Collection 1, Earthworm Jim and MechWarrior 2
- Microsoft Home Pak includes: Publisher Deluxe, Encarta Encyclopedia, Monster Truck Madness and CD sampler
- 5-year/3-year Micron Power warranty

\$2,899

CUSTOM SERVER SOLUTIONS

Vetix™ EL 1000

INTEL 200MHz PENTIUM® PRO PROCESSOR

- Dual Pentium Pro ZIF sockets
- 256KB L2 cache, flash BIOS
- Memory upgradable to 512MB
- Slots: 1 ISA, 3 PCI, 1 shared PCI/ISA
- Adapter: PCI 32-bit Ultra SCSI Fast-20 controller
- 12X SCSI-2 CD-ROM drive, 3.5" floppy drive
- 64-bit 1MB ISA video
- 3Com® 3C905-TX Fast EtherLink® PCI 10/100-base-TX
- Full-size tower with 10 drive bays
- 15" Micron 15FGx, 28dp (13.7" display)

- Microsoft® Mouse, 104-key keyboard
- Microsoft Windows NT® Server 4.0 (10-user license)
- NOS support (3 incident resolutions)
- 5-year/3-year Micron Power™ warranty

\$4,299
Bus. lease \$146/mo

- 32MB ECC EDO RAM
- 2GB Ultra SCSI hard drive

\$4,799
Bus. lease \$163/mo

- 64MB ECC EDO RAM
- 4GB Ultra SCSI hard drive

Vetix™ EL 2000

DUAL INTEL 200MHz PENTIUM® PRO PROCESSORS

- 256KB L2 cache, flash BIOS
- Memory upgradable to 512MB
- Slots: 1 ISA, 3 PCI, 1 shared PCI/ISA
- Adapter: PCI 32-bit Ultra SCSI Fast-20 controller
- 12X SCSI-2 CD-ROM drive, 3.5" floppy drive
- 64-bit 1MB ISA video
- 3Com 3C905-TX Fast EtherLink PCI 10/100-base-TX
- Full-size tower with 10 drive bays
- 15" Micron 15FGx, 28dp (13.7" display)
- Microsoft® Mouse, 104-key keyboard

- Microsoft Windows NT Server 4.0 (10-user license)
- NOS support (3 incident resolutions)
- 5-year/3-year Micron Power warranty

- 64MB ECC EDO RAM
- 4GB Ultra SCSI hard drive

\$5,599
Bus. lease \$176/mo

- 128MB ECC EDO RAM
- Two 4GB Ultra SCSI hard drives

\$6,699
Bus. lease \$210/mo

ADVANCED NOTEBOOK SOLUTIONS

TransPort™ XPE

MOBILE INTEL PENTIUM® PROCESSOR WITH MMX™

- Intel 430MX Mobile PCI chip set
- 256KB L2 pipeline burst cache
- 64-bit PCI graphics accelerator, 2MB VRAM
- BX modular CD-ROM drive
- Pick-a-Point™ dual pointing devices
- Sound Blaster® 16-bit stereo sound
- Built-in stereo speakers and microphone
- Card bus- and zoomed video-ready
- 2 infrared ports, 1 front, 1 rear
- S-video and NTSC-video outputs
- Built-in game port
- Motorola® Montana 33.6 fax/modem

- Management Pak: MPEG Arcade™ Player, ASAP WordPower™, Quicken® SE, SPRYNET™ Internet trial membership
- Executive Travel Pak: Greg Norman Ultimate Challenge™ Golf, Quicken® Expensable, LapLink®, FocalPoint™
- 2 modular expansion bays (CD-ROM drive, hard drive, 3.5" floppy drive, lithium-ion battery)
- Custom nylon carrying case
- Microsoft® Windows® 95 CD
- Microsoft Office CDs
- 5-year/3-year Limited Micron Power™ warranty

- 150MHz Mobile Intel Pentium processor with MMX
- 32MB EDO RAM (80MB max.)
- 12.1" active matrix color display, 800x600
- 2.1GB removable hard drive

\$4,599
Bus. lease \$156/mo

- 166MHz Mobile Intel Pentium processor with MMX
- 48MB EDO RAM (80MB max.)
- 12.1" active matrix color display, 800x600
- 2.1GB removable hard drive

\$4,999
Bus. lease \$170/mo

OPTIONS

- MicronDock™ multimedia port replicator with warm docking and built-in game port
- Micron Executive desktop package
- 3Com® PCMCIA ethernet adapter, 10-base-T
- Samsonite® leather carrying case upgrade
- 2nd intelligent lithium-ion battery
- 2nd 1.4GB modular hard drive
- 2nd 2.1GB modular hard drive
- 166MHz Mobile Pentium processor with MMX upgrade
- 3GB primary hard drive upgrade
- MMX enabled software



• 900 E. Rother Road, Tempe, AZ 85282 • Mon-Fri 9am-7pm Sat 9am-5pm (MT)
• International Sales Hours: Mon-Fri 9am-7pm (MT) • Phone: 208-893-3434 • Fax: 208-893-3424
• Purchase Order Fax: 208-893-8992 • Technical Support Available 24 Hours / 7 Days
• Technical Support Phone: 833-FIX-417PC • Technical Support E-mail: techsupport.mic@micon.com

MICRON™
ELECTRONICS, INC.

800-707-2329

<http://www.micron.com>

Make a Great PC Even Better!

Custom configure your new Micron Electronics system with these popular options.

Multimedia Options

- 16-bit 3D Waveable stereo sound.....\$59*
- 16-bit 3D Waveable stereo soundcard w/2MB RAM.....\$99*
- Advent® AV270 Powered Partners® stereo speakers.....\$99
- Advent AV370 Powered Partners stereo speakers w/subwoofer.....\$199
- Microsoft® SideWinder™ 3D Pro joystick.....\$59
- Microsoft SideWinder gamepad.....\$39

Storage/Media Options

- Adaptec® 2940U Ultra SCSI Fast-20 controller.....\$100
(upgrade from system with standard Ultra SCSI Fast-20 controller)
- Plector™ 12Plex 12X 1.8MB/sec SCSI internal CD-ROM drive.....\$200**
(upgrade from systems with standard 12X EIDE CD-ROM drive)
- Iomega® Jaz™ SCSI drive with 1GB removable cartridge.....\$399**
- Iomega Zip™ IDE drive with 100MB removable cartridge.....\$99
- Iomega 6-pack of 100MB Zip cartridges.....\$99
- Iomega Ditto™ 800 (400/800MB) Travan™ tape backup w/tape.....\$149
- Iomega Ditto 3200 (1.6/3.2GB) Travan tape backup w/tape.....\$199
- Sony® 4/8GB SCSI DDS-2 DAT tape backup w/tape.....\$999**

Communications Options

- 33.6kb V.34 internal data/fax modem.....\$139***
- 33.6kb V.34 internal telephony data/fax modem w/full duplex speakerphone and voice mail.....\$159***†

Networking Options

- 3Com® 3C589 ethernet ISA NIC (DNC, AUI & RJ-45).....\$99
- 3Com 3C595 Fast EtherLink® PCI 10/100 NIC (RJ-45 only).....\$159
- SMC® ISA TokenCard network card.....\$19

HP® Printer Options

- HP DeskJet® 690c printer—photo-quality color printing for the home, complete with cable.....\$369
 - HP LaserJet 5L-PS printer—affordable B&W printing, complete with cable.....\$499 (with ribbon)
 - HP LaserJet 6P printer—full-featured B&W printing, complete with cable.....\$799
- Additional DeskJet/LaserJet models available. Please call for details

NEW



Software Options

Adventure Pak: Shilo Ray the Brave, Putt-Putt® Saves the Zoo®, Reader Rabbit's Reading Development Library™ 1; Froddi Fish™ and the Case of the Missing Kelp Seeds™, and the Thinkin' Things™ Collection 2.....\$69
(available only on desktop and notebook systems with Windows® 95)

Quicken® Financial Pak: Quicken Deluxe, Quicken Financial Planner™, Quicken Parents' Guide to Money™, Quicken Family Lawyer™ and Free TurboTax® 1996 coupon.....\$79
(available only on desktop and notebook systems with Windows® 95)

Display/Video Options

- 17" Hitachi® SuperScan™ 1711 (15.9" display) .26dp color monitor.....\$150 ††
- 21" Hitachi SuperScan 2111 (20" display) .26dp color monitor.....\$650 ††
- Number Nine® Imagine™ 128 series II video card w/4MB VRAM.....\$500 †††

TransPort™ Options

- MicronDock™ multimedia port replicator: ethernet 10BT LAN adapter, SCSI-2 port, S-video and NTSC-video output, built-in stereo speakers, infrared port, headphones, microphone, line-in jacks, parallel, serial, VGA and 2 PS/2® ports (with warm dock and built-in game port—available on XPE models only).....\$299
- Micron Executive™ desktop package: matching black 17" monitor (15.8" display), mouse, mousepad and keyboard (can be used with or without MicronDock).....\$699
- Motorola® Montana 36.6 fax/modem supports regular telephone connections, cellular phones and two-way paging devices.....\$259

Service Options

- Extended 2-year on-site service coverage for desktop systems.....\$99
(upgrade from optional 1-year on-site service coverage)
- Extended 3-year on-site service coverage for desktop systems.....\$139
(upgrade from optional 1-year on-site service coverage)
- Complete on-site PC installation (call Micron Electronics™ for details).....\$159

Other Options

- APC® Pro/IT surge suppressor.....\$99
- APC Pro/IT surge suppressor.....\$59
- Microsoft Natural Keyboard®.....\$49
(upgrade from standard keyboard)

* Upgrade from systems with standard 16-bit stereo sound card

** Requires SCSI host adapter

*** V.34 modem includes trial memberships to CompuServe®, Prodigy® and America Online®

† Requires sound card

†† Upgrade from systems with standard Micron 17" 17F6x color monitor

††† Upgrade from systems with standard 64-bit 2MB video card

Options and accessories available with system purchase only.

MICRON™
ELECTRONICS, INC.

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<http://www.mei.micron.com>



Mr. Showbiz

WWW.MRSHOWBIZ.COM

Follow the activities in Hollywood with the clever daily columns, features, and tidbits in Mr. Showbiz. You can check out current movie, TV, theater, and music reviews, as well as star bios and Academy Awards databases. All the articles are written with biting wit and a sarcastic style, and each piece is augment-



ed with elegant graphics, audio files, and photos of your favorite stars. Read the box office and music charts and the TV ratings to stay tapped into what's popular with the general populace. You can participate in water-cooler polls or try to win one of the frequent contests that add to the fun.

The Old Farmer's Almanac

WWW.ALMANAC.COM

You don't have to live on a farm to benefit from The Old Farmer's Almanac. The online version of this slice of Americana brings you folklore and old wives' tales along with recipes, tidal charts, weather predictions, and planting charts. It's a wonderful, creatively designed site with some innovative features, such as a nifty lunar calendar and a sunrise/moonrise calculator for your location.

The Onion

WWW.THEONION.COM

"Dalai Lama Decks Photographer in Disco Melee." "Cop Kills Own Partner, Vows to Track Self Down." With news stories like these, you can be sure The Onion is out to entertain,

not inform. This hilarious online version of the comedy newspaper won't win any Web design awards, but the stories, updated every week and written at great length with a completely straight face, are always good for some serious laughter.

Outside Online

OUTSIDE.STARWAYE.COM

This Web-based version of *Outside* magazine provides strong original content with plenty of exclusively Web material. Features are lively and varied: One day, you could be reading a story documenting the adventures of a family that's sailing around the world with a laptop and posting updates, and the next you might find your way up the Tibetan peak of Mount Kailas. The coverage of naturalist issues and outdoor sports is outstanding here. Overall, this site has the potential to spur on the actively recreating and the couch potatoes of the world.



Parent Soup

WWW.PARENTSOUP.COM

Parent Soup provides you with resources that will (with any luck) make you a better parent and your child a better son or daughter. Advice, interactive chats, and a searchable library help both ease your mind and give you a dose of reality—two things every parent needs once in a while. If you're looking for information about curfews, adoption, divorce, toddlers, school-related issues, or single parenthood, you'll probably find it here and at a price considerably less than what your neighborhood psychiatrist charges (it's free). Also, you can search the member database for parents that are interested in the same topics you are. Nothing soothes the soul like commiseration.

Pathfinder

WWW.PATHFINDER.COM

Time Warner's massive site displays all the company's wares: record labels, magazines, movies, and books. From *Time* magazine to Elektra Records to Bugs Bunny, it's all here. With Time Warner's recent merger with Turner, you can now get to CNN on Pathfinder too. You can read about the arts and plan vacations—even scan a kids' section, complete with kid-friendly movie and Web guides. To cater to the Web crowd, the daily Netly News is added, along with a Digital Pulse section, which offers Web site reviews and Internet news. Since everything on the site is searchable, it's also a good place to research current events or popular culture. You can also get just what you want from Pathfinder with its Personal Edition, available for \$4.95 a month or \$29.95 a year.

Playbill On-line

PIANO.SYMORP.COM/PLAYBILL/

However occasionally you attend theater—whether in New York, London, or Iowa—using *Playbill's* site to find a ticket is easy. You search the database by theater, show, or city (you can even specify "for kids"), and you get details about the show and the area: local maps, restaurants, and hotels. When you order (the service charge is \$4 to \$5), you receive confirmation by e-mail. *Playbill* provides you with the latest theater-related news



about casting notices and national tours, plus information on theater-related travel packages. You can play games, answer quizzes, and get information on your favorite celebrities. For even more info, you can enter a name in "Who's Who" for a list of credits, or read the Broadway stars' answers to your bulletin-board questions.

Experience VRML

WWW.PLANET9.COM

Some of the best VRML worlds can be found here on Planet's site, including *Virtual San Francisco* and the *VRML Opera*.

WWW.VRML.SGI.COM

The pioneers in 3-D computing offer a must-see site for what's hot with VRML.

WWW.WEBLYNX.COM

This comprehensive index lists hundreds of VRML sites on the Web.

Rocktropolis

WWW.ROCKTROPOLIS.COM

Walk through the streets of Rocktropolis for a while and you'll be up to date on all the latest music news and the newest bands. This site wins for both design and content: It's great-looking and jammed with enough activities to keep you busy for quite a while. Just listening to all the RealAudio files of complete songs from new artists would take over an hour. You can also chat with celebrities and fellow enthusiasts in the Buzz Cafe. Rocktropolis is an enthusiastic supporter of live Web music events, too.

Salon

WWW.SALONMAGAZINE.COM

Salon is the highbrow e-zine for critical culture vultures. Daily columns on the media, music, new books, and the news give you a reason to check out Salon every day. Original reviews, articles, and interviews about society, art, literature, film, and more—posted every Monday—are guaranteed to keep you engaged (interviews with



What part of your life are you willing to risk?

Your financial records?

Your email?

Business correspondence?

Your business files?

Your personal files?

Your applications?

Funny articles off the Internet?

Your type fonts?

Your personal organizer?

Your games? (Yikes!)

Love letters?

Your kid's sports schedule?

Budgets?

Your stock portfolio?

Meeting notes?

Faxes?

Medical history?

Did we mention your financial records?

It only takes a few minutes to protect yourself. Is that too much?

Protect yourself from viruses.

More of your life goes on the computer every day. Could you lose it all? It's more likely than you think. If you or your children share floppy disks, you could pick up a virus. If you download stuff from the Internet, you could pick up a virus. Either way, everything in your computer is at risk.

That's why you should protect yourself with Norton AntiVirus.* Norton AntiVirus automatically detects and eliminates virtually all viruses before they corrupt your system or attack your files.

But what about new viruses? After all, more than three new viruses are discovered every day. How can you be sure your files are safe?

Well, at the Symantec AntiVirus Research Center, the industry's largest dedicated team of virus experts works continuously to identify and neutralize these viruses before they can endanger your computer.

We make sure you get our latest developments and protective measures in your hands with a click of your mouse thanks to our exclusive Live Update feature.

Norton AntiVirus

Norton software from Symantec is designed to give you more control over your computing experience. Protecting you from viruses is just the start. Find out how we can make your computing life safer and more productive.

Visit us at www.symantec.com.

Or call 1-800-822-6417, ext. 91112 for more information. And pick up your copy of Norton AntiVirus at your local reseller today. After all, why take the risk?

**Protect yourself.
Protect your friends.**



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*\$69.95 is the estimated retail price for the Windows 95 2.0 full version. Upgrade prices are available. Other versions are available for Windows 3.x and Macintosh. Norton AntiVirus is a registered trademark of Symantec Corporation. All other brand names or trademarks are the property of their respective owners. ©1997 Symantec Corporation. All rights reserved. In Canada, call 1-800-365-8641. In Australia, call 02 879-6577. In Europe, call 31 71 535 3111.

**START
DOING
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THINGS**



- 8:02AM** – "Mr. Lawson, the Chairman wants to see your quarterly report in his office. The one with the singing and dancing pie charts. By 11 AM. Sharp."
- 8:05AM** – "Help me out, Tom. The Engineering VP wants to copy our schematics this morning. Can you take your notebook there and use your Fast Infrared port?"
- 8:22AM** – "Mr. Lawson, just a reminder, 9:30 video conference with the Frankfurt office. They received the spreadsheets you e-mailed yesterday."
- 8:34AM** – "Thanks for those schematic files, buddy. By the way, your new notebook's under 5 pounds and mine's almost 9. You're giving me 4 strokes on the golf course, pal."
- 9:17AM** – "Lawson, the CIO says 100BaseT Fast Ethernet is the way to go for our new office downtown. Your new notebook can access the network easily."
- 10:15AM** – "Tom, the data you need is on multimedia CD. Bring your notebook to Marketing."
- 10:33AM** – "Guten Morgen, Thomas. Very good conference call this morning. Sales are up as your analysis predicted. The spreadsheets really helped."
- 11:30AM** – "Tom, this is the Chairman. Great presentation. You're going to our test site in the Mojave Desert with the Engineering VP, my friend. It's a full day of meetings, so bring an extra battery and a sleeping bag. There's no electricity."

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Helen Mirren and Jamaica Kincaid were both news makers). Salon is a sane and classy stop on your Web tour.

Swoon

WWW.SWOON.COM

Condé Nast finally packages its glossy magazines *Details*, *Glamour*, *GQ*, and *Mademoiselle* into a site that delves into sex, lifestyles, and the tribal rituals of twenty-somethings everywhere. Most notable for personal ads and raunchy discussion forums, the site also offers you advice, horoscopes, and a place to complain about how horrible it is to live with your parents.

t@p online

WWW.TAPONLINE.COM

t@p online has a little bit of everything on draft. At this youth-oriented, exuberant site, you'll find job resources, "newz" dissection, spycams for voyeurs, a travel database, technology reviews and jargon, and entertainment and sports features. Check out the Virtual Dorn, a "Real World" on the Web; add your picture to the Chat Family Photo Album; and visit various chat rooms and message boards. With all this witty banter and commotion, t@p online can definitely be a place where everybody knows your name.

Walter Miller's Home Page

PAGES.PRODIGY.COM/NELL/WALTER/

You won't find a bit of art nor a single graphic here, just the badly misspelled text of young Walter recounting the horrors of living with his abusive, scatologically obsessed grandfather in half of a prefab house somewhere in Texas. It's got to be fake, of course, but no one is sure—at least not yet. This site may not be for everyone, but if you like it on your first visit, subsequent installments will leave you in stitches. A word of caution: You may want to read this at home. As Walter himself explained, several people

have already been fired for laughing too hard at work.

Word

WWW.WORD.COM/

Word may be the quintessential e-zine out there. Its distinctive home page set the standard for pre-Java animated artwork, but its persona has always been grounded in erudite, well-written prose. Editor Marisa Bowe's band of sardonic twenty-something scribes consistently delivers highly personal, entertaining work that is a welcome anodyne to typical print magazine fare. Though Shockwave and RealAudio recordings occasionally augment a serial feature or an absurdist column, the Word experience cannot be had without a working sense of humor and a modest education.



You Don't Know Jack

WWW.BEZERK.COM

It's absolutely amazing that the online version of Berkeley Systems' wild and edgy trivia game plays just like the CD-ROM version. You'd never know you were on the Web as the hilarious host guides you through nutty and very funny rounds of trivia. Play alone or against an opponent, and yes, there are commercials.

Zoloft

WWW.SPECTACLE.COM

If you like interactive games that take advantage of the latest technology on the Web, you have to play Zoloft. You're drawn into a gothic adventure/mystery that drips with as much atmosphere as many of today's full-blown CD-ROMs. A narrator takes you through an initiation process, but after that, you're pretty much left alone. Your mission: to observe and gather information in order to protect the Society.

News/Views

CNN Interactive

WWW.CNN.COM

When breaking news happens, you tune in to CNN on TV. You should log on to CNN's site as well, as it's one of the Web's finest multimedia news sources. This busy site helps you navigate easily through the day's top events and images and to delve into past CNN stories via a keyword search tool. The site covers world news, politics, sports, weather, science and technology, style, show biz, and health. The most impressive



feature, however, is the video vault, which covers everything from sports highlights to entertainment news. The video vault makes it possible to watch the space shuttle take off again or critique with your friends President Clinton's last State of the Union address. You can download the NewsPager, a Shockwave application that runs from its own browser window and delivers headlines from CNN all day. Also available here is information from CNNfn, CNN's financial news network, and CNN/SI should be up by the time you read this for constantly updated sports news.



popular office pastimes available online: fantasy leagues that let their members take living vicariously through today's sports heroes to a new level.

Excite Live!

LIVE.EXCITE.COM

Excite Live! is a customizable news page with a difference: You can define what news you'd like to receive down to an amazing level of detail, and using its cool agent tools, you can refine your selections as you use Live! to get the news that you want. You can also create a Web clipping service for any topic that interests you. Just ask Excite Live! to watch for articles on, say, television, and it coughs up a lot of information from over 400 sources. You click

ESPN Net SportsZone

ESPN.NET.SPORTSZONE.COM

Although you'll have to pay to take advantage of all of its services, SportsZone offers all the content of its cable-TV cousin: scores, stories, stats, schedules, standings, video, and sound. For the fan or the fanatic, SportsZone hits a home run. The daily, up-to-the minute analyses and features help keep you on top of everything from the NCAA Run to the Final Four to the Stanley Cup playoffs. You'll also find one of the most

Make the Web Move

VDO

WWW.VDO.NET

Choose from a large selection of sites featuring VDO streaming audio

Vivo

WWW.VIVO.COM

Check out a full index of sites that utilize Vivo's streaming-video player, including CNN Interactive and Fine Line Features

on the ones you like the best, and it learns from your choices. The more you tell this site about what you're interested in, the better it gets at delivering the goods. Why can't the TV networks learn to do this?

Los Angeles Times

WWW.LATIMES.COM

Replete with coverage of the entertainment industry, the full-text version of La-La Land's leading newspaper is a great online read with many innovative fea-



tures. You can scan all the day's headlines from one page with easy access to both the full story and section highlights. You can search through two years of movie reviews in the movie review database; find restaurant reviews based on type of cuisine, neighborhood, price, and rating; and follow your favorite sports teams' upcoming schedules with Game Tracker. Even the classifieds are here and searchable. You can also sign up for a customizable news page called Hunter, so every time you log on, the news that interests you from today's paper has been collected for you.

Mercury Center (San Jose Mercury News)

WWW.SJMERCURY.COM

The San Jose Mercury News brings the best of its print version to the Web and adds much, much more. You can get up-to-the-minute news, read the sports pages, view the classifieds, and visit Digital High, a collection of news, views, and stories collected by and for teens in the San Jose area. The paper's renowned science and technology coverage is available, and the Listening Post provides you with a collection of civic-minded information, ideas, and methods you can use to make a difference.

New York Times

WWW.NYTIMES.COM

Now a simple registration process gives you free access to all the news that's fit to print—electronically. In addition to all the articles from the paper, you get CyberTimes, a special section focusing on technology and the Internet, and Web Special, an area where you'll find exclusive content not found in the print version. If you're job or apartment hunting, the expansive, searchable New York Times classifieds are still one of your best bets. Check out the forums in which you can discuss burning issues with fellow readers and the newspaper's staff. And yes, puzzle fans can play an interactive version of the famous crossword.

NewsPage

WWW.NEWSPAGE.COM

If you're looking for news on anything business-related, making NewsPage your first stop might be a good idea. Featuring 2,500 topics from over 630 news sources, this page is searchable by category or topic. You can personalize the page via a NewsPage Direct option designed to bring you exactly what you like to read and leave out all the extraneous stuff. Stock quotes and a general-interest area provide balance.

NPR on the Web

WWW.NPR.ORG

NPR keeps the tradition of great radio alive while moving it to a new medium. The site's focus is on content, not presentation. Using the RealAudio plug-in, you'll be able to listen to hourly news updates, feature stories, and a varied assortment of regular programming. Informational content unique to the site includes an area where transcript information is available, as well as a list of local and international member stations.



PoliticsNow

WWW.POLITICSNOW.COM

This comprehensive political news and analysis site combines the efforts of ABC News, The Los Angeles Times, National Journal, Newsweek, and The Washington Post. Updated



daily, it tells you far more than you could ever absorb about the political scene, and from every imaginable angle. A must-visit for anyone who wants to stay informed on current political events.

PopSci.com

WWW.POPSCI.COM

The latest in science and technology merge on PopSci.com. This online version of Popular Science magazine is updated daily and features news in five different categories: Automotive, Computer, Electronics, Home Technology, and Science and Research. You can browse a How It Works section to see diagrams and read details that demystify the mysterious and broaden your general knowledge. A forum section provides the final link in the learning chain—a place to rehash it with a virtual community.

Suck

WWW.SUCK.COM

For a fresh helping of unbridled truth and Web sarcasm, Suck's contributors deliver every weekday. What's more, they're usually right on target. Each day, Suck offers a lead essay (complete with clever and obscure hyperlinks and creative graphics) that will have you howling and its subject seething. No person, company, or thing is safe from Suck's flip critiques and scathing indictments—not even Suck itself. Suck now gives you more than just its signature rant; it offers five features, updated weekly, that will double your guilty pleasure.

USA Today

WWW.USATODAY.COM

Featuring colorful pages, great photographs, and lots of tidbits of information, the only thing that will remind you that you're not actually reading the print version of USA Today is the absence of newsprint on your fingertips. The familiar News, Money, Sports, and Life sections will keep you up to date on what's important, what happened on the playing field, and what's hot. Check out the new Marketplace section, currently offering financial resources and electronic trading services but soon to offer everything from clothing to classifieds.

Wall Street Journal Interactive Edition

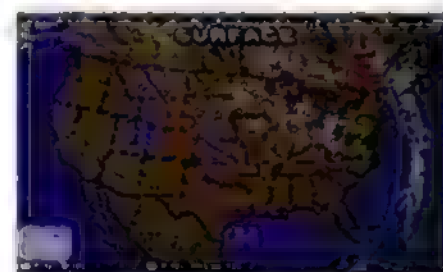
WWW.WSJ.COM

This incredibly rich subscription-based service features the top news—organized just as the paper is for a familiar experience—updated frequently throughout the day. The site adds audio and multimedia files to bring the news to life. You can even create your own personalized interactive edition. The first two weeks are free of charge; after that, you'll pay \$49 a year or \$29 if you're already a print subscriber.

The Weather Channel

WWW.WEATHER.COM

Not just another weather site, the Weather Channel delivers the latest forecasts with spiffy tech-



nology to help illustrate what's going on out there and how soon it will be dropping down over your city. You'll find great-looking maps and current satellite images along with the hows and whys of meteorology and the weather.

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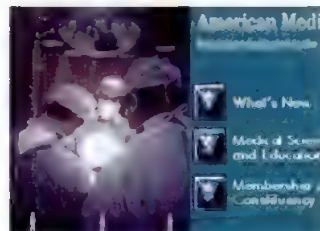
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Reference

American Medical Association

WWW.AMA-ASSN.ORG

Medical information—and plenty of it—from a reliable source is the AMA Web site's claim to fame. You can scan through the latest jour-



nals and papers, including the *Journal of the American Medical Association (JAMA)* and link to advocacy and grass-roots organizations. You can also search for specific diseases or ailments by keyword. Besides access to *JAMA* and several other medical journals, this site offers a very useful feature: AMA Physician Select. Need a doctor? Search the database of over 650,000 doctors in the U.S. by name or specialty.

Big Book

WWW.BIGBOOK.COM

Are your fingers tired of walking through the yellow pages? BigBook will give them a rest. This comprehensive collection of over 11 million U.S. businesses lets you find specific services anywhere in the country. BigBook also gives you nationwide street-level maps, third-party reviews, and customer ratings of businesses with which you might be unfamiliar—features you definitely won't find in your dog-eared yellow pages. In addition, you can build your own personal phone book for easy access to numbers you frequently call.

Biography Online

WWW.BIOGRAPHY.COM

Everyone loves to read about the rich and famous. But there's more

to life than just models and sports figures. The online version of the



award-winning A&E cable television show explores the diversity of history's famous and infamous. You can read about your favorite humanitarian or political figure, discuss Madonna's latest PR scam with other visitors, and play games that will test your history savvy. At the same time, you can keep up-to-date with TV happenings.

City.Net

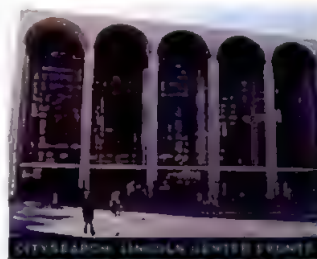
WWW.CITY.NET

This service of the Excite Internet directory gives you the lowdown on the top 25 U.S. cities and the top 25 international cities. Designed mainly for travelers, it has all the listings you need and even includes very precise interactive mapping that lets you pinpoint any location in the cities this site covers. Don't leave home without it.

CitySearch

WWW.CITYSEARCH.COM

If you reside in a metropolitan area where more than 1 million people work and play, you should familiarize yourself with CitySearch whether it's hit your town yet or not. Currently, you can get the



phenomenally detailed content CitySearch offers in New York City, Pasadena, San Francisco, and the Research Triangle in North Carolina, with Austin and Salt Lake City probably up by the time you read this. Each city is covered from a local perspective, providing real content all the way down to school lunches and volunteer programs. CitySearch editors live in every city covered on this site.

CyberAtlas

WWW.CYBERATLAS.COM

If you're interested in unearthing data about the dynamics of the Internet and its users, the place to start is CyberAtlas: The Internet Research Guide. This cleanly designed site offers loads of statistics and summaries of information from a variety of market-research sources, supplemented by concise and thoughtful analyses. The site, which is designed in the shape of a real compass, can help you find an abundance of data. Demographics, new market developments, modems, and software: It's all here for the asking. There's even an FAQ section and a glossary. In case you get lost or you're new on the Net.

Electric Library

WWW.ELIBRARY.COM

Have you ever pulled an excruciating all-nighter? Or begged the librarian to keep the stacks open just a few minutes longer? With Electric Library, you can write and research a paper at any time of the day or night. The site contains a searchable database of more than 150 full-text newspapers, 2,000 books, 9 newswires, 800 magazines, and a ton of maps, photographs, and literature—in short, everything you need to bring home that A.

Four11

WWW.FOUR11.COM

If you've ever tried to contact a long-lost friend or plan a family reunion, you know how difficult it can be to track down someone who's been out

of the picture for a while. Four11 makes it easy to find anyone's e-mail address or telephone number, using a simple interface and lots of search options. You can search by first or last name and drill down by city, state, or even country. And, you can add your own listing, complete with your past and present affiliations, including high school and college.

Library of Congress

WWW.LOC.GOV

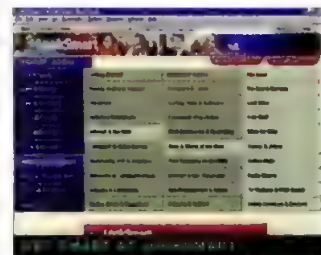
The American government's oldest cultural institution is thriving on pop culture's newest medium. The Library of Congress site provides the national citizenry with search access to its massive catalog, a guide to the U.S. Copyright Office, and an expansive database of current legislative information. No matter what your distance from Washington, you can examine the inscriptions and quotations that litter the Library's walls, peruse its current exhibitions, or familiarize yourself with its myriad paintings and sculptures. Surely Jefferson would approve of such democratic access to his most famous legacy.



LookSmart

WWW.LOOKSMART.COM

Reader's Digest has always excelled at gleaning the best literature and



combining it into a simple, straightforward read. LookSmart, a new search site designed and run by Reader's Digest, does the same thing for the Web: it provides a combination of exciting technology,

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www.liveconcerts.com
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great content, and a comprehensive search engine. Using LookSmart, you can browse through different categories, query five major search engines, and surf the Web, all from the same inventive interface, which you can experience in either Java or HTML.

A Man's Life

www.manslife.com

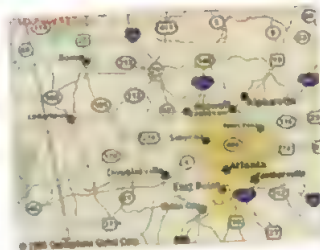
This online magazine is an encyclopedic collection of information for men to live their lives well. The articles, written with a good dose of attitude, cover everything from health and fitness to plumbing and are continually refreshed. Especially interesting are the wisdom section and the Bureau of Information, where guys can ask questions that don't fit the established categories. A Man's Life is a great example of an online magazine that keeps its content fresh and relevant.

MapQuest

www.mapquest.com

Taking a road trip? Wondering where in the world Malta is? This comprehensive site provides maps and information about cities and countries all over the world.

TripQuest lets you zoom from a map of the U.S. down to a map of your street—and yes, it will actually have your street. Or just enter your address and go straight to a zoomed-in view. The World Interactive Atlas features the same



zoomable maps to help you plan trips abroad, but it also adds the ability to find businesses; all you need is a name and a city. Access the site using Java and ActiveX applications; not only will you find your way, but you'll have fun doing it.

Museum of Modern Art

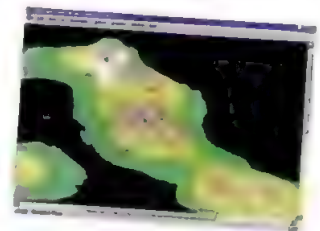
www.moma.org

For anyone who can't drop by New York's Museum of Modern Art, the MoMA site gives you an experience that is as close to being there as is possible—without the drafty halls. You can study paintings, drawings, and sculpture, check out the current and future collections, and even visit the Museum Shop. If you plan to make the trip eventually, you'll find everything you need to know about visiting the museum, including hours of operation, admission prices, and a detailed transportation guide.

NASA

www.nasa.gov

Designed for anyone who ever looked into space and dreamed of flying to the moon, NASA's site is the best



place to go for news about space exploration, aeronautics, and astronomy. You'll find information about all of NASA's affiliated institutions, including updates on the latest space shuttle missions, recent Hubble Space Telescope images, links to the Shuttle Web, the latest news releases, astronaut biographies, and the Astronomy Picture of the Day. The history of space travel is well documented, with a great picture gallery and a Human Space Flight link.

National Geographic

www.nationalgeographic.com

Get ready for a wild ride as you enter the National Geographic site. Lavish photos, engrossing magazine stories, and Web-only features create a nearly complete multimedia experience. Easy on the eyes and a joy to read, this site is rounded out by RealAudio, live chats, a map database, historical maps, and stuff for kids.

Scholastic Network

www.scholastic.com

This subscription-based site created by Scholastic, the largest educational publisher in the world, is targeted at children and teachers. Following existing elementary and secondary school curricula, the site can be accessed all year



and utilized much as a textbook or a filmstrip might be. Chats, interactive projects, a ton of original content, and a bevy of famous authors and people with whom the kids can interact will make learning fun while providing direction and ideas for teachers. This is just the site to initiate parents into the idea of children learning on the Web.

Scientific American

www.sciam.com

The Web incarnation of *Scientific American* balances information, clarity, and a killer presentation to

make it easy for anyone not only to understand but to enjoy learning about science. You'll find articles, news, summaries, and looks at the past on this site. Weekly Web-only features include explorations, interviews with experts, bookmarks of other cool sites, and explorations that raise good questions and get your brain working.

Thomas: Legislative Information on the Internet

thomas.loc.gov

If you want to keep an eye on what your government is doing, this is the best place to go. Want to know what bills are close to becoming laws or whether your taxes will be going up or down? You can find all legislation of the current (105th) and previous sessions of Congress, along with the Congressional Record and Commit-



tee Reports for each of those sessions. When looking for legislation, you can use

keywords to search for concepts or sponsors. You can also narrow your query to bills in the House or Senate, bills that were subjects of floor action, or bills that were signed into law. A Historical Documents area will give you the background on what's going on and why something is ruled unconstitutional. □

The Why Files

whyfiles.news.wisc.edu/

If TV or print reports don't always sate your scientific curiosity, visit The Why Files and dig deeper into the science, math, and technology that increasingly influence your life. The site was created by the National Institute for Science Education at the University of Wisconsin at Madison for people who want to explore the science behind the news—something often left out in news articles.



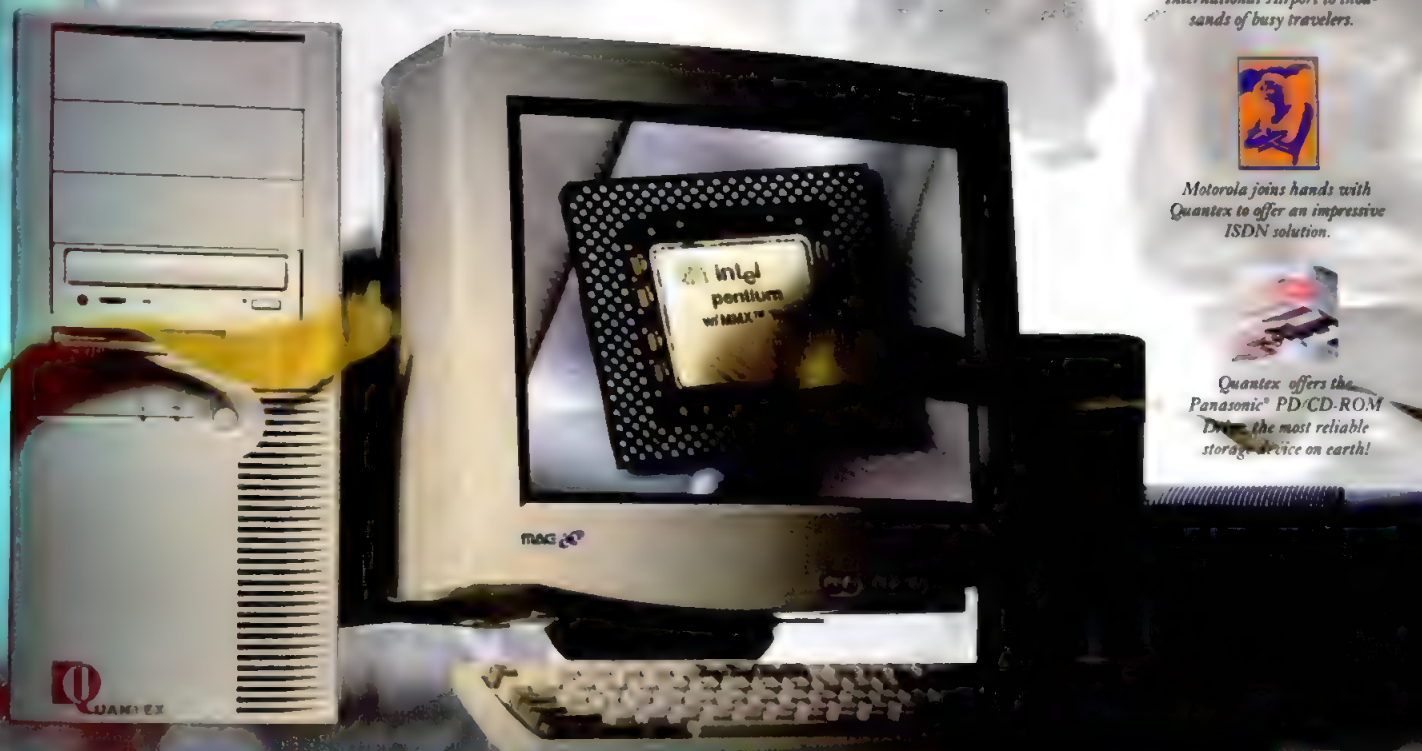
Intel and Quantex form a partnership promoting Videophone technology in Newark International Airport to thousands of busy travelers.



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Quantex is recognized as a leader in performance and technology. Quantex has appeared on the cover of Computer Shopper 3 times in 1996! (April, August and December, 1996)

Quantex PC's consistently offer top notch performance and usability. Quantex has received PC Computing's coveted ***** 4-star rating 3 years in a row (1994, 1995, 1996).

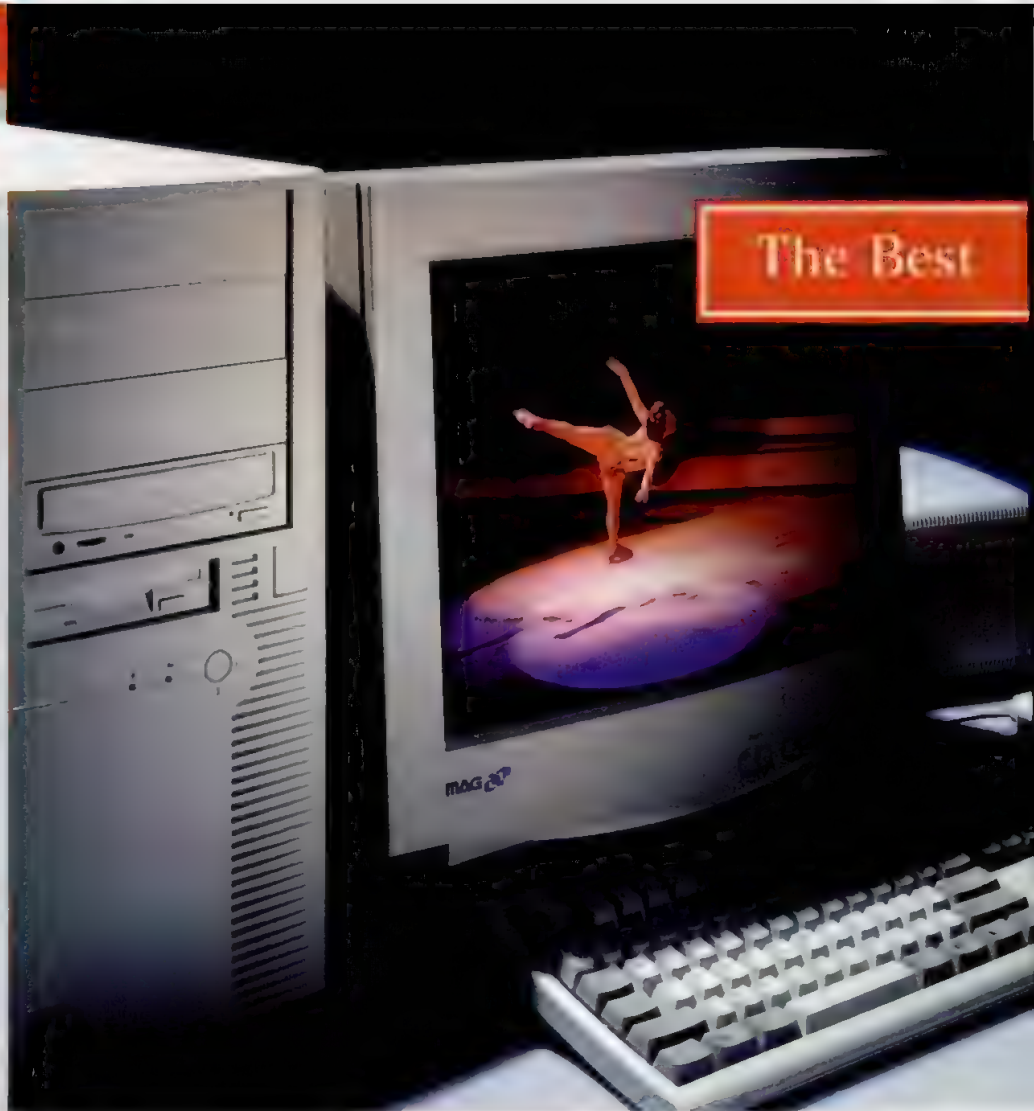
Quantex consistently offers industry recognized value and quality. Quantex has been on the Windows Magazine's Recommended List 39 times in 1996 alone!

Quantex consistently offers award-winning PC solutions. In 1995 and 1996, Quantex won 11 PC World Best Buy awards and has been on the PC World Top 20 List over 40 times.

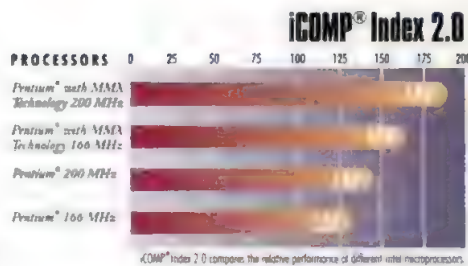
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PC Magazine, 12/3/96



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- Ensoniq VIVO-90 32-Bit Wavetable Synthesizer
- Altec Lansing ACS-400 Speakers w/ACS-250 subwoofer
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News, sports, weather, and stock quotes happen; they get chronicled by wire services and then uplinked to a satellite. Other information gets created by content providers and uploaded to a Web server.

Content providers download the satellite information and produce content to be placed on their Web servers. The Web server pushes content to software clients on users' desktops through the Internet whenever it receives new information. The server can also check for new messages when polled by the client and send what it finds.

Users with direct Internet connections can receive information pushed to their desktops continuously. Dial-up users can schedule updates regularly.

ONLINE CONTENT

The Web Delivers

News, sports, weather, and even software come to your desktop.

By David Lidsky

The software client that sits on the user's desktop can display the information it receives in a variety of formats. You can customize which content you receive, and most content is hyperlinked to further information at the content provider's Web site.

As an alternative to using Internet bandwidth, content providers can take the raw content that they receive, package it, and uplink it to a different satellite. It's then downlinked to the PageNet pager network, where it's broadcast to wireless FM receivers (such as the News-Catcher) on the user's desktop.

Even though the Web offers better content every day, its rich resources will go to waste if you can't devote the time to get the information you want.

But what if this information arrived with almost no effort on your part? We're starting to see a new crop of Internet products that will make this possible. Although the current implementations focus largely on news and information delivery, this new technology will alter the way we get everything from financial data to software updates.

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Information delivery is more reminiscent of television broadcasting than the active point-and-click routine we're used to using on the Web. For example, many of the services we review let you select "channels" that deliver focused types of content. But there are also enormous differences between TV and Web delivery. On the Web, you can customize what's delivered and choose when and how you want to view it. The content also uses hyperlinks that lead you back to the Web, and the objects you can receive are far more varied, including text, data, Java applications, and even software.

The last few months have seen a variety of solutions that help solve the problem of knowing what's on the Web. As content providers learn to create a better one-on-one experience for users, the Web will no longer just be a place to which people go; it will also come to you.

WHAT WE REVIEWED

The products that we covered had to offer an intelligent software client that employs the public Internet as a source of news, in-

formation updates, or software. We reviewed only products with hyperlinked content that run while the user isn't online.

We initially found 18 products, but we review only 11. We did not review NetRadio Network's NetCompanion or Real Audio Player Plus, because they require a constant Internet connection to operate. OpenWEB NetDeploy had no implementation over the public network, and CNN NewsPager didn't contain hyperlinks to Web content. ArrIve, from Ifusion.com Corp.; Simulcast, from PipeDream; and Transceive, from Caravelle, did not ship in time to meet our test deadline.

BRINGING IT HOME

Each product offers a different approach to delivering content. Some transform your screen saver from a place for frivolity to your main source of information. Berkeley Systems' AfterDark Online and The PointCast Network both use this method as their primary delivery vehicle. My Yahoo! News Ticker attaches itself to your screen saver and your Microsoft Windows 95/NT System Tray.

Some services deliver information through a floating ticker, which feeds you updates without getting in your way. Among these services are My Yahoo! News Ticker, IBM NewsTicker, and AirMedia Live Internet Broadcast Network, which features an array of marquees and tickers that can be placed anywhere on the desktop.

A couple of products don't deliver content per se but notify you when information is available. Intermind Communicator works from within your browser, and NETdelivery sits on your desktop as an unobtrusive icon.

BackWeb pops up on your screen to deliver a nugget of information and leaves just as quickly. Sometimes, it installs a screen saver or desktop wallpaper, or it launches a recently downloaded Shockwave game. Netscape's In-Box Direct brings HTML pages right to your Netscape mail client. Also, AlphaConnect StockVue and Marimba's Castanet Tuner run applications from within a window. With the exception of AirMedia, all of these technologies are free. IBM NewsTicker and

Editors' Choice

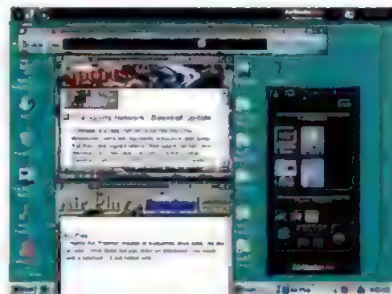
- AirMedia Live Internet Broadcast Network
- The PointCast Network



Our two Editors' Choice award winners are the only two products in this developing medium that combine an appealing package of Internet content with an innovative delivery mechanism.

The AirMedia Live Internet Broadcast Network, from AirMedia, bypasses the Internet for delivery but accesses all its power. AirMedia pushes content onto your desktop (in near-real time) better than any other service. Each topic comes to you with its own creative application, and users can access the content in a variety of ways. You can even pay a bit extra and connect your e-mail account to AirMedia, which will then notify you when you have new mail.

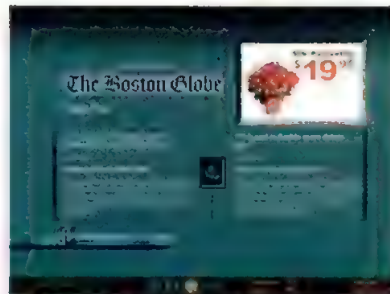
A pioneer in actively delivering content to your desktop, The PointCast Network remains one of the best. Running as a screen saver or a standalone application, PointCast offers a broad range of topic categories and



AirMedia presents content in various ways.

branded content from major newspapers. Its interface makes information gathering a snap, and its high level of configurability helps you get to the information you want.

An honorable mention goes to BackWeb, from BackWeb Technologies, and Castanet Tuner, from Marimba. Both offer powerful delivery technology, although neither has had the opportunity to develop a roster of content to match. BackWeb's strength is its imperceptible downloading of information while you're online and its support for Netscape Navigator plug-ins right on your desktop. Castanet is a Java-based system that could be used to deliver anything Java can create. You should keep an eye on these emerging products.



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8X modular CD-ROM drive
Pick-a-Point dual pointing devices
Sound Blaster 16-bit stereo sound
Built-in stereo sound speakers
and microphone
Motorola Montana 33.6 fax/modem
Card bus- and zoomed video-ready
2 infrared ports, 1 front, 1 rear
S-video or NTSC-video output
Built-in game port

Management Pak: MPEG Arcade™ Player,
ASAP WordPower™, Quicken™ SE,
SPRYNET™ Internet trial membership
Executive Travel Pak: Greg Norman
Ultimate Challenge™ Golf, Quicken™
ExpensAble™, LapLink™, FocalPoint™
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256KB L2 pipeline burst cache
8X modular CD-ROM drive
PCI graphics accelerator, 1MB EDO RAM
Pick-a-Point dual pointing devices
Sound Blaster 16-bit stereo sound
Built-in stereo speakers and microphone
2 infrared ports, 1 front, 1 rear
S-video or NTSC-video output

Management Pak: MPEG
Arcade Player, ASAP WordPower, Quicken
SE, SPRYNET Internet trial membership
2 modular expansion bays
(CD-ROM drive, hard drive,
3.5" floppy drive, lithium-ion battery)
Custom nylon carrying case
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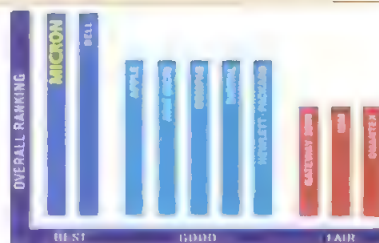
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Motorola Montana 33.6 fax/modem
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Source: PC World test overall PC company
for reliability and service, December 1998



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Web Delivery Systems: A Bundle of Features

Today's Web delivery systems vary widely in their underlying technologies and the actual content they deliver. But all point toward the same trend: bringing the wealth of information on the Internet to you without your direct intervention. Almost all use a channel metaphor, letting you pick exactly what you want.

AfterDark Online

Free

- Sends content as headlines or summaries
- Delivers content as screen saver
- Features animation
- User can customize content and interface
- User can update content manually

AirMedia Live Internet Broadcast Network

\$24.95 a year

- Sends content as headlines or summaries
- Delivers content in proprietary format
- Features audio and animation
- User can customize content and interface
- User cannot update content manually

AlphaConnect StockVue

Free

- Sends content as headlines or full text
- Delivers content in proprietary format
- Features audio.
- User can customize content and interface.
- User can update content manually

BackWeb

Free

- Sends content as headlines, summaries, or full text
- Delivers content as wallpaper, as screen saver, as HTML document, or in proprietary format
- Features audio and animation
- User can customize content and interface
- User cannot update content manually.

Castanet Tuner

Free

- Delivers content in Java
- Features audio and animation
- User can customize content
- User cannot update content manually.

IBM NewsTicker

Free

- Sends content as headlines
- Delivers content in proprietary format
- User can customize content and interface.
- User can update content manually.

In-Box Direct

Free

- Sends content as full text.
- Delivers content as HTML document.
- Features audio and animation
- User can customize content.
- User cannot update content manually.

Intermind Communicator

Free

- Sends content as headlines, summaries, or full text
- Delivers content as HTML document
- Features audio
- User can customize content
- User cannot update content manually.

My Yahoo! News Ticker

Free

- Sends content as headlines
- Delivers content in proprietary format.
- User can customize content and interface
- User can update content manually

NETdelivery

Free

- Sends content as headlines
- Delivers content in proprietary format
- Features audio and animation
- User can customize content and interface
- User cannot update content manually.

The PointCast Network

Free

- Sends content as headlines, summaries, or full text
- Delivers content as screen saver, as HTML document, or in proprietary format
- Features animation
- User can customize content and interface
- User can update content manually

PointCast are supported through advertising; most of the others rely on selling technology to content providers.

MANY ROADS, SAME DIRECTION

A number of these Internet content products reach your desktop through different paths. Castanet is a complete Java environment, delivering not only content but cross-platform capability. AirMedia

bypasses the Internet and its potential snares when delivering content, opting instead for wireless transmission via the pager network. BackWeb downloads content only when the live connection is inactive, thus maximizing your bandwidth use without disrupting your online activity. Intermind uses an object known as a *Hyperconnector* to check for new information.

Regardless of the user's experience or the under-the-covers technology, the content comes to you in one of two ways: *push* or *pull*. In the push method, the server initiates contact with the client when new information is ready to be transmitted. With the exception of the news tickers, each of the reviewed products can push information to the client when there's an active connection.

In the pull method, the client asks the server to send any new information. The news tickers can be configured to pull information quite frequently, but they do not get material pushed to them. Most of

Our Contributors: THOMAS MACE is a senior editor of *PC Magazine*. NANCY SIRAPYAN is the librarian at *PC Magazine*, and ANDREW BOSCARDIN is an editorial researcher at the magazine. DAVID LIDSKY was the associate editor in charge of this story, and JAY MUNRO was the project leader.

the remaining products can be configured to pull for new information either when you're connected or (for dial-up users) on a schedule.

PERSONALIZING THE WEB

If Internet content products didn't allow you to customize your content, they wouldn't provide much more than regular Web surfing. Some products divide content into categories for which you can define your preferences; others let you select which content providers you'd like to receive information from.

Today, you still receive what content providers want you to see, and your choices as to customized content are somewhat limited. When content providers can use these technologies to make your online experience unique to your particular interests, your information acquisition will change forever. For now, join the leading edge of this boom and watch the excitement come to you.

Berkeley Systems Inc.

AfterDark Online

Downloadable for free, Berkeley Systems' AfterDark Online is a lightweight version of Berkeley's well-known AfterDark screen saver, which displays news and information on your desktop instead of the usual flying toasters. Although it's a visually attractive offering, AfterDark Online falls somewhat short on content and customization features. You don't need to own the commercial AfterDark product to use it, because AfterDark Online includes the core AfterDark engine.

AfterDark Online obtains its news from well-known sources, including USA

Today, ZD Net, and Sports Illustrated Online. With your screen saver activated, you receive news headlines and summaries based on the preferences you've selected. Clicking on the displayed items launches your Web browser and takes you to the full text. You can configure a ticker at the bottom of the screen to track up to 7 sports categories and 25 stocks. Unfortunately, you cannot track specific teams, and you are unable to receive detailed stock price information.

You can download news updates manually or schedule them periodically. Dial-up users can configure AfterDark to dial their Internet service providers, download a news update, and disconnect. AfterDark Online has Microsoft Windows 95 and Mac versions. If your news needs are not highly specialized, then AfterDark Online is worth a try.—*Nancy Sirapyan*

AfterDark Online. List price: Free. Berkeley Systems Inc., Berkeley, CA; 800-344-5541; www.afterdark.com. Circle 445 on reader service card.

AirMedia, a division of Ex Machina Inc.

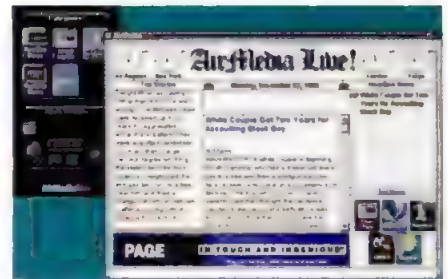
AirMedia Live Internet Broadcast Network



With its slick interface and timely delivery of selected Internet content via radio, AirMedia Live Internet Broadcast Network 1.0 is an appealing service for information-hungry users who lack a full-time Internet connection. Its array of features, including e-mail notification, do have a price: You must initially purchase a NewsCatcher wireless receiver (\$150 street price) and an AirMedia service plan.

Basic service is free for the first year, and it costs \$24.95 per year thereafter. Premiere service offers more frequently updated content, such as stock reports twice an hour; this option costs an additional \$5.95 per month and is well worth it. Premiere service with e-mail notification costs \$9.95 per month.

AirMedia collects information from Internet content providers and broadcasts it over the PageNet pager network. You receive it through the pyramidal NewsCatcher built by Global Village Communication (www.globalvillage.com), which connects to your PC via a supplied serial cable.



Extra! You can access all your AirMedia content from this newspaper interface.

AirMedia features news, business, games, and sports information. Content providers include Quote.Com, SportsLine USA, and Yoyodyne (CNN should also be available by the time you read this). You do need to have your PC on to receive information, and you may want to leave it on so you don't miss anything. In testing, AirMedia's Premiere service delivered sports scores and news summaries in near-real time. Most content is hyperlinked so you can go online for the full story.

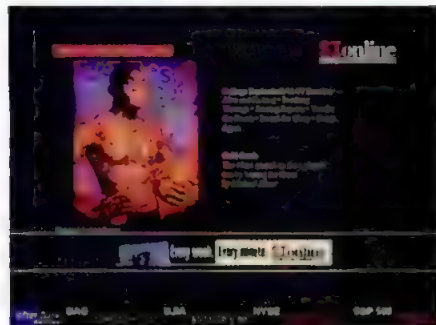
Content is usually presented in scrolling marquees, which can be minimized to become small headline tickers. Overall, AirMedia offers a near-constant fix for information junkies without straining your Internet connection.—*David Lidsky*

AirMedia Live Internet Broadcast Network 1.0. List price: Basic service, first year free; \$24.95 per year thereafter. AirMedia, a division of Ex Machina Inc., Newport Beach, CA; 800-247-6334; www.airmedia.com. Circle 446 on reader service card.

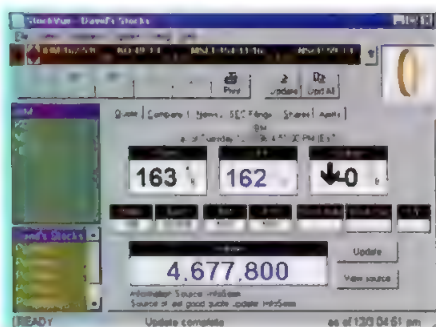
Alpha Microsystems

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AlphaConnect StockVue 1.1, lite version. List price: Free. Alpha Microsystems Inc., Santa Ana, CA; 888-226-6398; www.alphaconnect.com. Circle 447 on reader service card.

BackWeb Technologies

BackWeb

Delivering a variety of content to your desktop in a bandwidth-friendly and nonintrusive manner, BackWeb 1.1 offers a creative way for content providers to reach interested users. Content providers have yet to explore BackWeb's innovative technology fully enough for its potential as a delivery mechanism to be realized.

Once you've downloaded the free BackWeb client, you can subscribe to a variety of channels that are offered by individual content providers. When you're on-

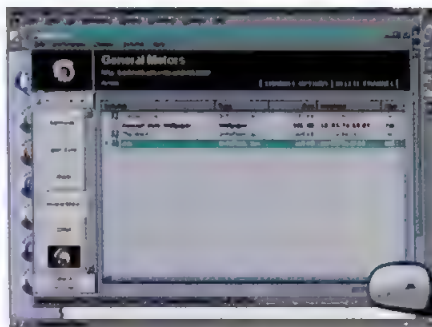
line but not actively surfing the Web, BackWeb begins to download available content from providers' servers. The content arrives as InfoPaks—screen savers, desktop wallpaper, audio messages, and even small applications—from your selected channels. The BackWeb client even supports Netscape Navigator plug-ins; a Shockwave game, for example, can be sent to you and BackWeb will play it on your desktop.

The primary delivery vehicle is an InfoFlash, a small graphic or animation that floats across your screen and often contains a hyperlinked blurb or headline. Clicking on an InfoFlash launches your Web browser so you can view the full story.

BackWeb had about 10 channels available during testing, including Infoseek, Open Zone, ZD Net, and iWorld. At press time the company had added 20 channels, including SportsLine USA and the NetRadio Network, with its launch of an updated beta version.

You can keep the InfoPaks from being intrusive by using the extensive list of preference options. You can determine how long the mouse and keyboard should be idle before an InfoPak plays, and you can set each channel's priority or even disable a channel. During installation, you can determine what types of InfoPaks you'd like to receive. Future versions of the BackWeb client will let you receive and run Java applets and applications from within the BackWeb browser.

A promising technology with great user controls, BackWeb will appeal to you as long as you like the offerings of the content providers.—Andrew Boscardin
BackWeb 1.1. List price: Free. BackWeb Technologies, San Jose, CA; 800-863-0100; www.backweb.com. Circle 448 on reader service card.



Clever items pop up on your desktop with BackWeb, such as GM's rearview mirror.

Marimba Inc.

Castanet Tuner

Marimba's Castanet Tuner is the visible component of a content-distribution technology that promises to be one of the more exciting of the new channel-based Internet products. At present, though, it does not provide enough content to let us deem it one of the best.

Castanet is currently a Java-based system, and its channels are Java applications. When you subscribe to a channel with Castanet Tuner, it requests the download of the corresponding application from an Internet-based Castanet Transmitter serv-



Castanet Tuner delivers Java applications to your desktop and updates them automatically.

er. Castanet Tuner then saves the Java application onto your hard disk. When launched, channels can either operate locally without a live Internet connection or (where appropriate for the channel's type of content) communicate across the Internet with server components to provide improved functionality.

A Castanet channel can be anything a programmer can create in Java. And because Castanet stores Java applications permanently (unlike the applet model, which relies on storage memory), you don't need to download the full application when you load a channel. If the application or its data has changed, then Castanet handles updates automatically.

Although Castanet provides a few sample channels, all channels will be built and hosted by third parties; at press time, few of these were available, the most impressive one being a chat channel produced by HotWired's Talk.com service. Netscape will reportedly include Castanet technology in its next-generation browser, Netscape Communicator. Marimba ultimately plans to extend Castanet beyond Java to make it a vehicle for compiled

binaries (software subscriptions or updates, for example).

Castanet is a new technology with few implementations to test. But its mixture of Java, persistent storage, and automatic updates should make it a significant venue for delivering multimedia content and applications on the Internet.—*Thomas Mace Castanet Tuner*. List price: Free. Marimba Inc., Palo Alto, CA; 415-328-5282; fax, 415-328-5295; www.marimba.com. Circle 449 on reader service card.

IBM infoMarket

IBM NewsTicker

The free IBM NewsTicker 2.1 delivers a continuous stream of great information from top-notch sources, including Reuters, cnet, and the Nando Times. Once you've set your preferences, news headlines start scrolling across the ticker. Clicking on a headline launches your browser so you can read the full-text article. Currently, NewsTicker is limited to mainstream news; it does not offer information on weather conditions, stock



IBM NewsTicker can satisfy any network user's need for news.

prices, or industry updates.

News users will probably like being able to keep the ticker in sight by placing it on top of all other open windows. Unfortunately, even at its smallest size (about ½ inch high by 7 inches long), the ticker is still big enough to interfere with your work (its only real drawback). One reason for its large size is the paid advertisements incorporated into the ticker's interface.

Unlike My Yahoo! News Ticker, which runs only under 32-bit Windows, the IBM NewsTicker will also work under Windows 3.x, Mac, and Unix. Oddly, it doesn't run under OS/2. You can choose how frequently news gets updated when you're online, but you cannot schedule information to be regularly downloaded if you're a dial-up user, making IBM NewsTicker best suited to networked users.—NS

IBM NewsTicker 2.1. List price: Free. IBM infoMarket, Falls Church, VA; 800-231-8219; www.infomarket.ibm.com. Circle 450 on reader service card.

Netscape Communications Corp.

In-Box Direct

If you'd like graphically enhanced news and features sent straight to your Netscape Navigator e-mail in-box as reliably as your paperboy delivers the local *Tribune*, then Netscape's In-Box Direct could be the service for you.

With In-Box Direct, you can choose from a variety of name-brand offerings, including *The New York Times*, *The San Jose Mercury News*, cnet, HotWired, Yahoo!, ZDNet, and feature magazines such as *Salon*. The pages that you receive

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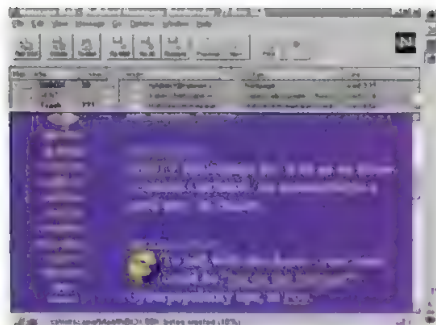


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In-Box Direct. List price: Free. Netscape

Communications Corp., Mountain View, CA; 415-937-2555; www.netscape.com.
Circle 451 on reader service card.

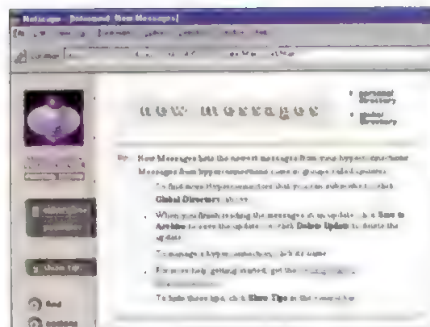
Intermind Corp.

Intermind Communicator

More of a notification system than an actual delivery service, Intermind Communicator can be an effective way to keep up to date with favorite sections of particular sites or to publish information to others. Unfortunately, its technology seems to hold more promise than is currently being implemented by its roster of content providers.

As a subscriber, you choose which publishers interest you from the global directory. A Hyperconnector (an object containing text, links, and instructions on how you can communicate with the publisher) is then downloaded onto your system. Current publishers include Discovery Online, HotWired, iWorld's Netday News, and Virtual Vineyards.

Publishers can send updates as frequently as they wish. At present, though,



Content providers such as HotWired can use Intermind to notify you of new content.

not enough specialized content is being sent to users with any frequency. Major publishers tend to send daily updates; others send them weekly. You can customize your updates by clicking on the Personalize link and deselecting any offerings you don't want. Keeping the What's New link open ensures that you'll be notified of updates to the site and your Hyperconnector.

Intermind gives you all the tools you'll need to publish your own Hyperconnector to other users. Publishers can also purchase anonymous demographic informa-

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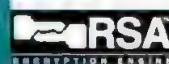
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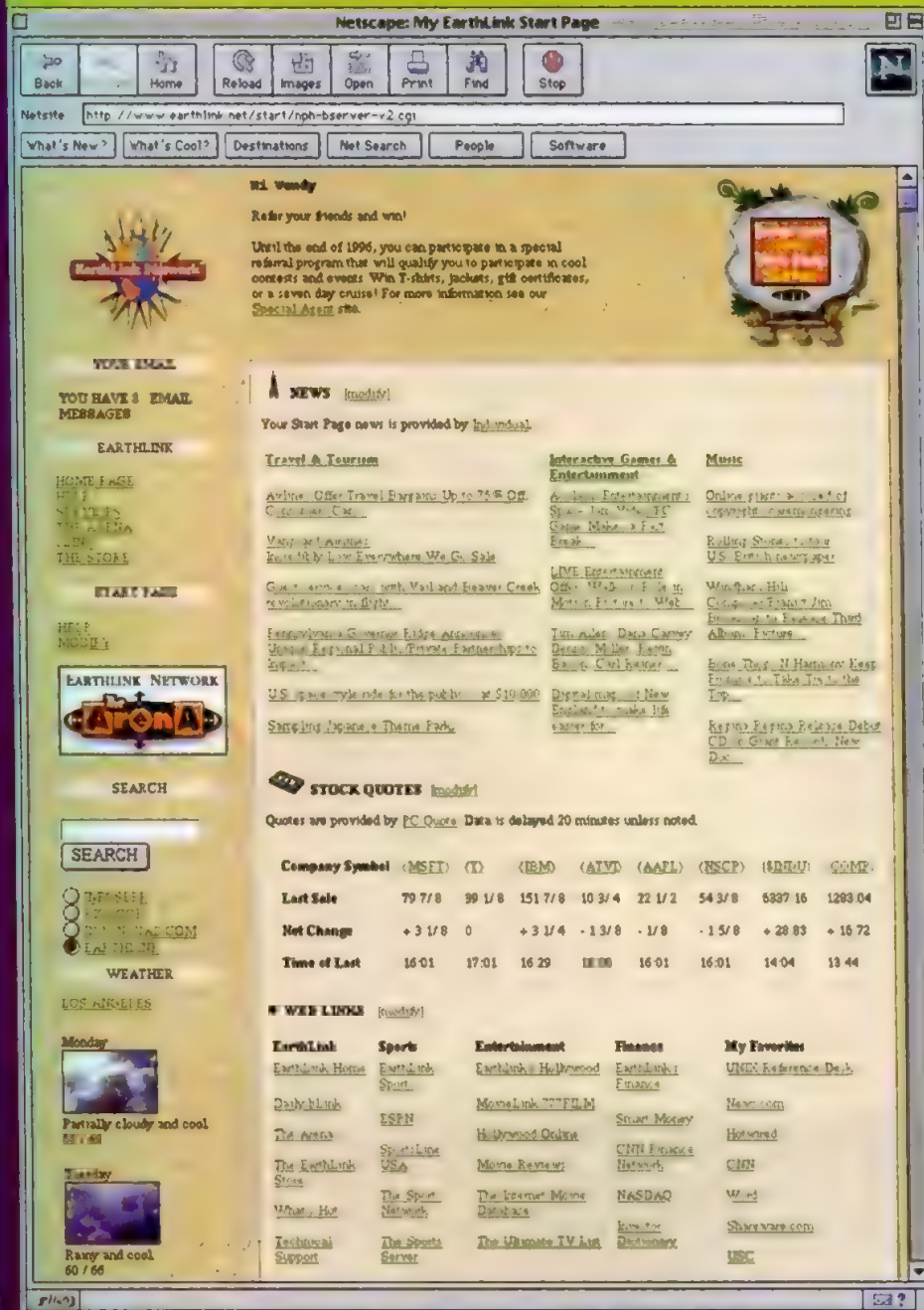


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tion that Intermind Corp. collects on the preferences and basic data of its users.—**DL Intermind Communicator.** List price: Free. Intermind Corp., Seattle; 800-625-6150; www.intermind.com. Circle 452 on reader service card.

Net Controls Corp. and Yahoo! Inc. My Yahoo! News Ticker

With its customizable, nonstop news ticker, the free My Yahoo! News Ticker, from Net Controls Corp., is a great choice for information junkies who want an unobtrusive, lightweight source of news. But before you can use NewsTicker, you need to register for a My Yahoo! home page and set your preferences. You then can choose from such topics as technology, business, entertainment, and sports. Content providers include BusinessWire, PR Newswire, Reuters, and Weathernews.

Headlines and stock quotes scroll by while you work, and if you double-click on a headline, quote, or sports score, you will launch your browser and load the full-text article on Yahoo! A search button on the ticker also lets you launch a Yahoo! search and takes you directly to the results page in your browser. You must use Microsoft Internet Explorer 3.0 or any version of Netscape Navigator with News Ticker.

You can customize ticker features and decide how often news gets refreshed. You can't schedule when the ticker downloads information, though, so modem users will need to update their tickers manually. The ticker resides in your system tray in Windows 95 or Windows NT, but you can detach it and place it anywhere on your screen. You can also attach it to your screen saver.

My Yahoo! News Ticker is a simple and elegant way to receive information right on your desktop. Net Controls also offers a customized ticker and news feed that suits the needs of businesses and organizations.—**NS My Yahoo! News Ticker.** List price: Free. Net Controls Corp.; www.netcontrols.com. Yahoo! Inc., Santa Clara, CA; my.yahoo.com. Circle 453 on reader service card.

NETdelivery Corp.

NETdelivery

NETdelivery gives users of any operating system and browser the ability to receive free notification of new Web content. It works best as a tool to promote online commerce, but its notices should be more individualized.

NETdelivery features content from Yahoo!, the Weather Channel, and iWorld; more notably, Lands' End and Insight Direct use NETdelivery to market information. You can choose to receive



NETdelivery can notify you of the latest Lands' End deals.

notification of special offers, and by clicking on the notice you are able to launch the Web page featuring the sale.

The NETdelivery client normally appears as a small mailbox icon on your desktop. You can set the type of notification you'll receive for each of your subscriptions, with options such as opening the application or raising the flag on the mailbox icon.—**DL NETdelivery.** List price: Free. NETdelivery Corp., Fort Collins, CO; 970-223-1110; www.netdelivery.com. Circle 454 on reader service card.

PointCast Inc.

The PointCast Network



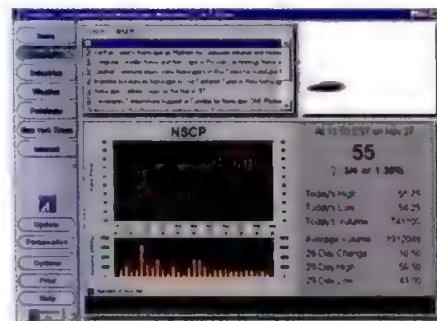
The PointCast Network was a pioneer in broadcast-style delivery of Internet content, and it remains one of the best. Don't look to it for premium information, since most of PointCast's content is accessible for free at other Internet venues. Its real value lies in the fact that you can make a custom selection from a large number of sources and have that information delivered to your desktop for

free in an attractive and engaging way.

PointCast delivers information using a channel metaphor (16 channels were available at press time). Some cover broad topics such as news, companies, industries, weather, sports, or the Internet. Others provide content from specific news organizations and Internet sites, including *The New York Times* and Pathfinder.

Most channels deliver straight hypertext with live links to Internet sites. Some channels are more graphically oriented than others: The weather channel, for example, offers you maps and satellite photos.

Content is displayed through either the PointCast client software or a screen saver. The client's look can vary depending on the channel, but in essence it provides one window for viewing headlines or summaries and a larger window for viewing full text or graphics. On the left, you will find a third window with a set of tabs and buttons for selecting channels and configuring the software. You can select how often you'd like PointCast to update your information, whether you're a dial-up



The PointCast Network delivers valuable content in a highly graphical format.

user or have a constant connection.

In screen-saver mode, PointCast animates your desktop with an ever-changing selection of headlines and graphics from the channels you have selected. Clicking on an item launches the client and lets you view the details. For those who want a painless way to track the daily news, PointCast is free, attractive, and easy to use.—**TM The PointCast Network, Version 1.2.** List price: Free. PointCast Inc., Cupertino, CA; 408-253-0894; www.pointcast.com. Circle 455 on reader service card.



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PC Magazine, Jan. 7, 1997
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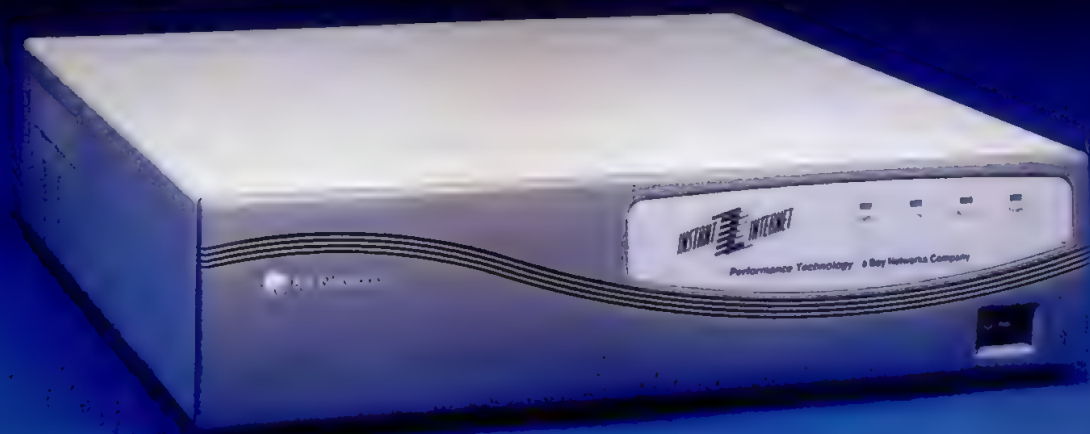


Network Computing, Sept. 15, 1996
Editor's Choice Award

"...easy installation, superior management features, and good performance..."



PC Magazine, Nov. 19, 1996
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It wasn't all that long ago that office productivity applications were the biggest battleground in software. Things have changed.

By Michael J. Miller

We used to devote dozens of pages to reviewing scores of individual word processors, spreadsheets, database products, and presentation graphics programs. But those days are gone, a casualty of the move to office productivity suites, which incorporate programs in all these areas and more.

Today, just three companies—Corel Corp., Lotus Development Corp., and Microsoft Corp.—produce office suites sold in North America. But that doesn't mean the market is standing still. All three vendors are moving forward with new Windows 95 versions that emphasize such features as more consistent user interfaces, much improved Internet integration, better programmability, and new collaboration features. And all three are planning other products in this market.

Microsoft, which dominates the market with as much as 80 percent of suite revenue, just began shipping its Office 97 suite.

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Join us online for a discussion of the suites, January 27-31.

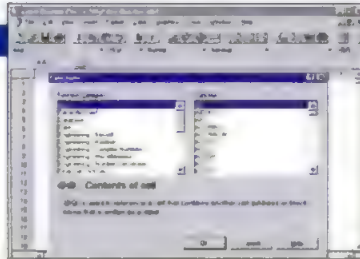
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The Best and Worst of Suites

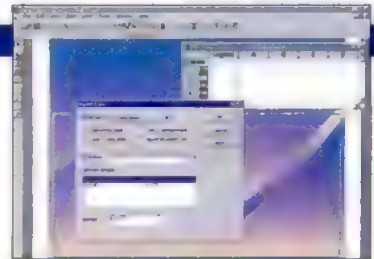
Throughout our testing of the suites from Corel, Microsoft, and Lotus, we found certain aspects of the applications impressive and others frustrating. Here are some highs and lows.

COREL OFFICE PROFESSIONAL 7

Corel Office Professional 7. List price: \$395; upgrade, \$129. Requires: 486-based PC or better, 8MB RAM, 32MB to 220MB hard disk space, Microsoft Windows 95. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-8200, fax, 613-728-9790; www.corel.com. **Circle 458** on reader service card



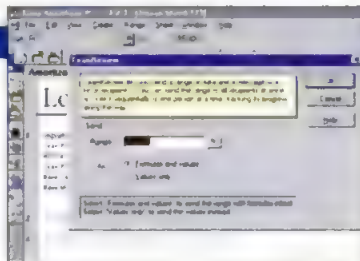
Corel Quattro Pro 7 still provides you with a larger function library than any other spreadsheet application.



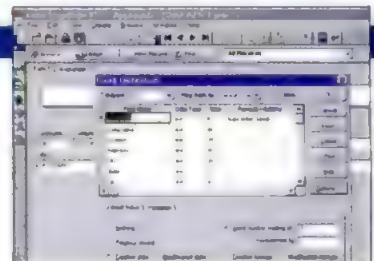
When importing spreadsheet data, Corel Presentations 7 has you define table ranges but doesn't show you the table.

LOTUS SMARTSUITE 97

Lotus SmartSuite 97. List price: \$399; upgrade, \$149. Requires: 486-based PC or higher, 8MB (for Microsoft Windows 95) or 16MB (for Windows NT 4.0) RAM, 64MB to 180MB hard disk space, Windows 95 or Windows NT 4.0. Lotus Development Corp., Cambridge, MA.; 800-343-5414, 617-577-8500; fax, 613-693-3512; www.lotus.com. **Circle 457** on reader service card.



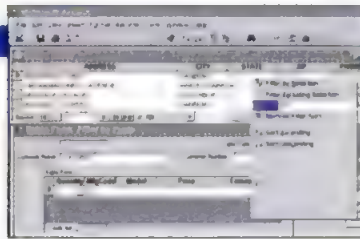
In Lotus's 1-2-3 97, you can send versioned or unversioned ranges to reviewers and incorporate their comments or changes.



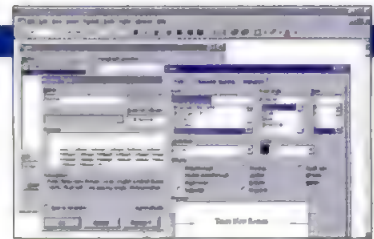
Lotus's Approach 97 doesn't set the correct starting number on imported serial-number fields.

MICROSOFT OFFICE 97

Microsoft Office 97, Professional Edition. Street price: \$600; upgrade, \$310. Requires: 486-based PC or higher, 8MB (for Microsoft Windows 95) or 16MB (for Windows NT 3.51 or later) RAM, 73MB to 191MB hard disk space, Windows 95 or Windows NT 3.51 or later. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329; www.microsoft.com. **Circle 456** on reader service card.



Microsoft Access 97 supports every popular query method and has the most capable, powerful query facility.



In Microsoft Word 97, you have to drill down through three menus just to change the point size in a style.

For the past several years, it has offered both a standard edition with Word, Excel, and PowerPoint and a professional version that adds the database program Access.

The new releases include updated and more tightly integrated versions of all these components. Microsoft has also added Outlook (a new information manager and e-mail client), an animated Office Assistant, new Internet tools, and Visual Basic for Applications, which is shared among all of the components.

But other signs indicate that the suite

market may yet get more competitive. Last summer, Corel—which created its suite out of earlier efforts from WordPerfect, Borland, and Novell—started selling its WordPerfect Suite 7, which combined WordPerfect; the Quattro Pro spreadsheet; Presentations; and Starfish's Sidekick personal information manager, all for the price of a word processor. Corel followed that in August with Office Professional, which adds Paradox, the CorelDraw engine, and the InfoCentral personal information manager, as well as a host of other bonus applications.

Corel also unveiled many unique fea-

tures, including Internet access and its Barista technology for creating Internet-ready Java versions of rich text documents. (Barista was later quietly added to newer copies of the WordPerfect suite.)

And as we write this, Lotus is on the verge of shipping SmartSuite 97, which offers updated versions of the Approach database, Freelance Graphics, and Word Pro, as well as the first 32-bit version of its 1-2-3 spreadsheet. It incorporates such features as an Internet-ready SmartCenter, which gives you an easy way to organize your files and Internet information, as well

as better collaboration tools, the LotusScript macro language, and an InfoBox, all now available on all of its applications (except Organizer). Lotus offers the standard SmartSuite and a version that incorporates a Notes client (called NotesSuite).

And while Microsoft has updated its suite only for Windows 95 and Windows NT, the other vendors are looking at other platforms as well. Corel's Office for Windows NT Server 4.0 is priced on a per-server basis, with no limit to the number of clients you attach to each server. And only Lotus offers an OS/2 suite, which recently shipped with 32-bit versions of Word Pro and Freelance Graphics; a 32-bit version of Lotus 1-2-3 is in the works.

In addition, Corel introduced new versions of its Windows 3.1 products in 1996 and is readying new versions of its WordPerfect suite for both DOS and Windows 3.1. And Corel plans to be the first vendor with a Java-based suite, which is due in the next few months. By the time you read this, a beta version should be on Corel's Web site. Indeed, some observers believe that in the age of the Internet and thin clients, you may want smaller applications that readily distribute across a network. Corel's Java-based suite may be one approach, acting as a container for such documents. And Lotus already offers an ActiveX/OLE version of Components, a collection of small modules that provide much of the basic functionality of the major office applications. Lotus is also readying a Java-based version of it.

Still, for most offices, the major competition for a new suite may be your present office suite or the one that came with your new PC. Nevertheless, each of the new

Editors' Choice

• Microsoft Office 97, Professional Edition



Once again, Microsoft is the winner in the war of the suites.

Microsoft Office 97, Professional Edition's excellent application integration and online help, first-rate features for creating custom tasks and applications, and new Internet tools—such as Web queries and hyperlinks—outdo its competition's features.

But Microsoft should have one eye looking forward and the other watching its back. To note: Lotus's SmartSuite 97, with its hallmark Team Computing, was the strongest suite in the area of collaboration. Corel, in its suite debut, now needs to improve application integration and collaboration and to strengthen its Internet functionality via its unique Barista technology.

Microsoft Word 97, like earlier versions, leads word processing with its more intelligent interface, its impressive automated text entry features, and its superior desktop publishing tools. Corel WordPerfect 7 has

suites offers unique new features: Microsoft has tighter integration and new Outlook features, Lotus emphasizes collaboration, and Corel offers a tremendous variety of software and unique Java functions.

In the story that follows, we review Microsoft Office 97, Professional Edition and Corel Office Professional 7 and con-

improved, but it's still lacking some of the ease of use that WordPerfect for DOS users grew to love. And Word has bettered many of the strengths of Lotus's Word Pro 97.

Microsoft Excel 97 also retains a strong lead. Its outstanding tools for analysis, model building, charting, worksheet presentations, applications development, and the Internet outclass those of Lotus's 1-2-3 97 and Corel Quattro Pro 7. Still, 1-2-3 could suit Lotus Notes users, particularly those who must share worksheets among dispersed workgroups.

With Microsoft Access 97's new Internet support, this database package builds on its other expert features: an industrial-strength database engine, a robust query facility, and a rich set of wizards. Although casual users will find Lotus's Approach 97 easier to use than Access, it lacks some of Access's core database features, such as the enforcement of validation rules during importing.

And in perhaps a surprising upset, Microsoft PowerPoint 97 surpasses Lotus's Freelance Graphics 97 in presentation graphics. Though Freelance holds a slight lead in ease of use and group support, PowerPoint takes first place with its extensive multimedia capabilities and ability to create interactive, standalone presentations. And Corel Presentations 7, like its suitemates, is competent but doesn't often equal its competition.

trast them with the not-quite-final SmartSuite 97 (which Lotus has delayed slightly). Note that by the end of February, Corel plans to ship legal, medical, and building-construction versions of its suite. A few months later, Corel plans to ship Version 8 of both WordPerfect Suite and Corel Office Professional. Microsoft also plans a small-business edition of Office 97, as well as a developers' edition that adds the Access runtime and some additional development tools. We will cover these new suites as they become available.

Our Contributors: MICHAEL J. MILLER is editor-in-chief of *PC Magazine*. EDWARD MENDELSON, SAL RICCIARDI, and CRAIG STINSON are contributing editors of the magazine, and WAYNE KAWAMOTO is a frequent contributor. YVONNE KOULOUTHROS is a staff editor, and technical director BEN Z. GOTTESMAN acted as the project leader in charge of this story.

SUITABILITY TO TASK: SUITES



Corel Office Professional 7



Microsoft Office 97, Professional Edition



Lotus SmartSuite 97

	Corel Office Professional 7	Microsoft Office 97, Professional Edition	Lotus SmartSuite 97
Application integration	Fair	Excellent	Excellent
Internet tools	Good	Excellent	Good
Collaboration	Poor	Good	Excellent
Programmability	Good	Excellent	Good

Application integration involves the consistency between the applications as well as interaction between them. **Internet tools** concerns how the user creates Web content and uses the Internet as a resource and a data store. **Collaboration** deals with the user's ability to exchange documents within an organization for review and distribution. **Programmability** concerns tools for creating custom tasks and applications.



REVIEWS BY EDWARD MENDELSON

No longer can you choose from ten word processors for your Windows desktop—not if you want collaboration and desktop publishing tools in addition to the more generic but still necessary features such as editing, formatting, automated templates and wizards, and management of long documents. The word processors from the three reviewed suites each take a good stab at fulfilling these criteria.

Corel Corp.

Corel WordPerfect 7

When Corel acquired WordPerfect from Novell, it breathed new life into the classic word processor. Corel WordPerfect 7, the new, 32-bit version, extends the vast range and power of earlier releases while clarifying the interface, adding automation features, and improving speed and reliability. This version retains the same file format and remains unrivaled in its ability to organize large documents and apply precise formatting. HTML- and SGML-editing capabilities also enhance Corel WordPerfect 7.

Formatting options in prior versions often seemed overwhelming, but this release offers on-screen lines you can drag to adjust margins, headers, and tables. Another option, QuickSpot, shows a button next to the current paragraph, graphic, or table; you click on it for fast, graphical access to the format controls you use most often.

Tables in WordPerfect now support 100 spreadsheet functions, and a new Floating Cell feature lets you easily display, anywhere in your text, the value of a

table cell. WordPerfect's typographic controls, for functions such as the precise positioning of any character, remain unparalleled. In addition, although this version no longer supports WordPerfect's DOS printer drivers, it includes unique control over Windows' printer drivers. For example, you can specify a different default font for each printer and save named settings for printers and fonts.

WordPerfect's Internet tools let you edit and create basic HTML files with tables but not forms. A wizard for building Web sites automatically creates a home page and any links to other pages, and a toolbar button lets you preview pages in Netscape Navigator. With Corel's Barista technology, you can save any WordPerfect document as a Java applet, so any formatting you display in the word processor will

appear in any Java-equipped browser.

Corel has also smoothly integrated Hypertext/Web Links, a longtime WordPerfect feature, with HTML editing. The dialog box for links shows the address of the page currently displayed in Navigator, and it lets you easily build a link to it. But unlike Word or Word Pro, WordPerfect won't let you open a Web page directly from the Internet. You have to save the page to disk from your browser before opening it in the word processor.

Although the basic outline and numbering features are easy to use, customizing and integrating them can be difficult. Corel promises major improvements in Version 8, due out in the first half of this year. That release will also include a context-sensitive toolbar, support for HTML forms, and a revamped equation editor.

Because WordPerfect continues to use Version 6's file format, the latest Windows release is compatible with earlier Windows and DOS versions. But the older format doesn't let you edit different parts of a file at once using separate windows, as you can in Word and Word Pro.

WordPerfect's depth and range of features make it almost a software suite in itself. Its mixing of WYSIWYG and code-based interfaces, however, makes this package more suitable for established WordPerfect users than for those who

SUITABILITY TO TASK: WORD PROCESSING



	Corel WordPerfect 7	Microsoft Word 97	Lotus Word Pro 97
Formatting/layout	Excellent	Excellent	Good
Text entry/correction	Good	Excellent	Good
User automation	Excellent	Good	Excellent
Collaboration	Fair	Good	Excellent
Desktop publishing	Excellent	Excellent	Excellent
Long documents	Excellent	Good	Good

Formatting and layout concerns the program's ability to control character, paragraph, and page layout. The **text entry/correction** rating reflects the tools for entering and editing text on the page. **User automation** involves the wizards and templates that are provided, as well as the user's ability to modify these and create his own. We also consider **collaboration**, taking a look at tools for creating, reviewing, and distributing documents within a group. **Desktop publishing** concerns the program's ability to create highly stylized document layouts. **Long documents** involves tools for managing documents such as table of contents, indexes, and master documents.

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November 1996
Boot Magazine
RE: Nimantics Orion 6X



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Boot Magazine
RE: Nimantics Orion 166



January 1997
Boot Magazine
RE: Nimantics Orion 8X 200



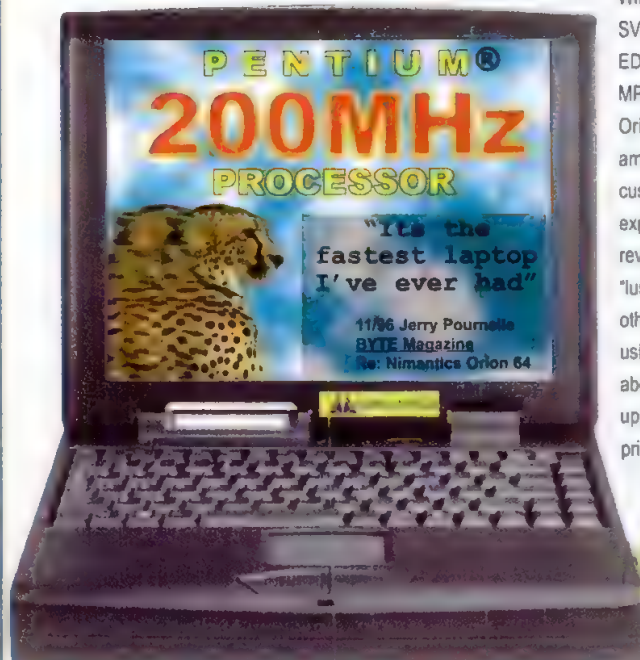
December 1996
Boot Magazine
RE: Nimantics NX-Ult 133



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October 1996
Byte Magazine
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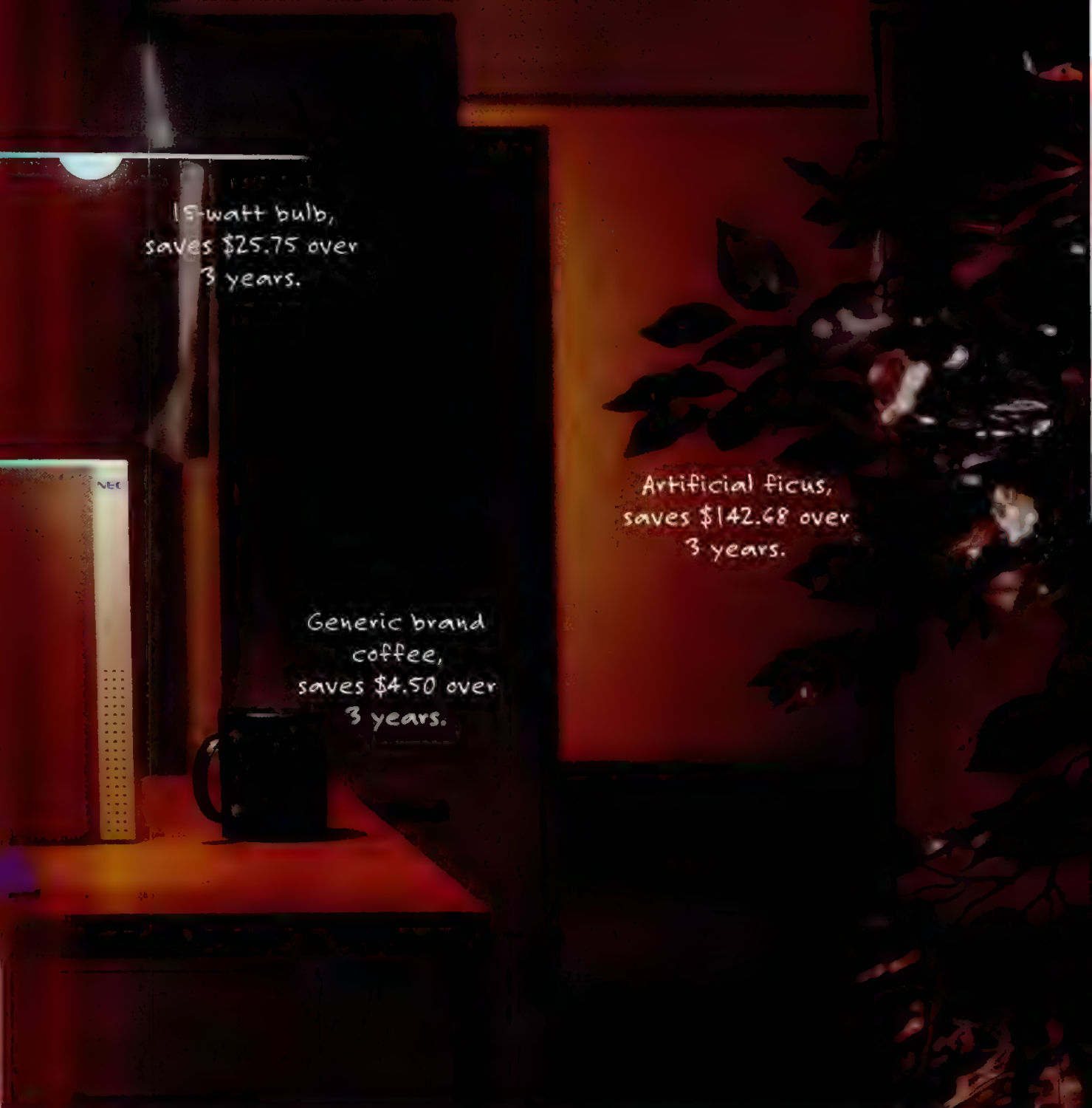
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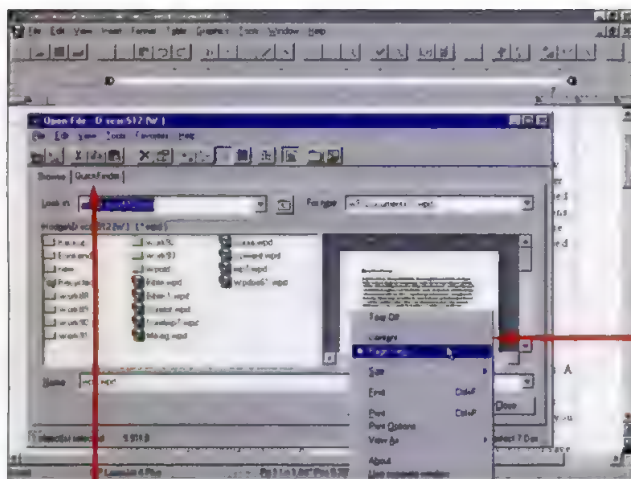
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Key # 22905



Corel WordPerfect 7's File/Open dialog box includes a tabbed interface for a fast, elaborate file indexer.

want to change to a new word processor. **Corel WordPerfect 7.** List price: None (the product is not sold as a standalone program, only as part of a suite). Requires: 486-based PC or better, 8MB RAM, 30MB to 220MB hard disk space, Microsoft Windows 95. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-3733; fax, 613-728-9790; www.corel.com. *Circle 458 on reader service card.*

Microsoft Corp.

Microsoft Word 97

PC MAGAZINE EDITORS' CHOICE Long the best-balanced and most intuitive of Windows word processors, Microsoft Word is now also the most powerful. Microsoft Word 97's menus and keyboard are basically the same as they are in Word 95, allowing effortless upgrading, but Microsoft has enhanced virtually every other feature, sometimes spectacularly.

Word now stores multiple versions of a document in a single file, and desktop publishing features include the ability to make text flow from one box to another on a different page. You can use a new table-drawing pencil tool to create tables on the screen instead of needing a dialog box, and a Document Map now displays all headers in outline form (and lets you jump to any header simply by clicking on it).

Word's impressive features for formatting on the fly now include the abilities to

let you apply boldface or italic to the first item in a bulleted list, as well as customize bulleting and numbering. The company has also

You can customize the preview window and then use the advanced viewers in Inso's Quick View Plus 4.0.

eliminated annoyances found in earlier versions of Word, such as

a bulleting and numbering dialog that didn't show your customizations. And powerful organizing features, such as cross-referencing and numbering, now equal or surpass similar features once superior in WordPerfect.

Webmasters will find Word an almost complete tool for building advanced HTML pages. You can create standard headings and layouts effortlessly and build complex elements, such as forms, from a toolbar. But you do need to understand the technical details of HTML forms processing, and if you want to build HTML forms seamlessly, you should choose a dedicated package, such as Microsoft's FrontPage. Otherwise, Word includes tools for building almost everything imaginable on a Web page, except frames and Java applets. For instance, you can add decorative horizontal

If you select an item from the Favorites list, Word connects to the Internet and opens the item.

lines and standard bullets using a menu, and you can have Word automatically convert Internet addresses into hyperlink fields.

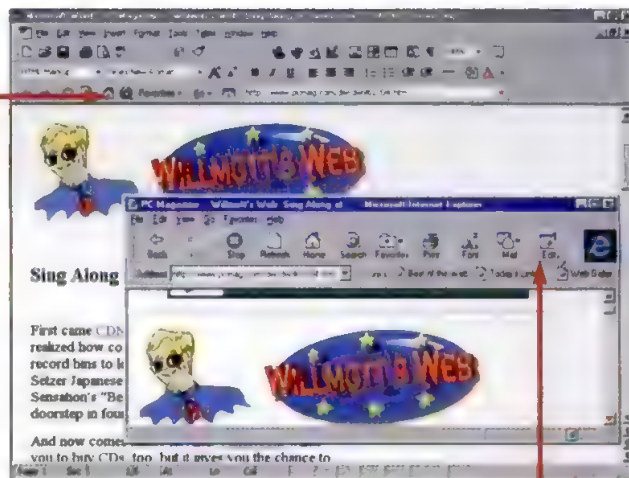
Also, Word now includes formatting features such as animated and blinking text. These resemble similar features you can build into HTML pages through Java or ActiveX applets, but they appear only in documents you

view in Word or in the free Word Viewer available from Microsoft's Web site. When you export a Word document to HTML format, Word converts these features into ordinary text.

Word has finally begun employing Visual Basic for Applications as its macro language instead of WordBasic, and it automatically converts the macros from its earlier versions when you open a document or template containing them. But a few hindrances remain from earlier releases: The master-document feature continues to link awkwardly to the outline feature, and you still menu-hop a lot if you want to create or modify styles by hand.

In addition, the View Options dialog box may baffle even expert users, because Word offers only options for the current view. You must close the dialog and change views before you can access all options.

But these are small flaws in a package that ranks as the best word processor—and among the most powerful and elegant applications for Windows—ever written. **Microsoft Word 97.** Street price: \$340; upgrade, \$85. Requires: 486-based PC or better, 8MB (for Microsoft Windows 95) or 16MB (for Windows NT 3.51 or later) RAM, 20MB hard disk space, Windows 95 or Windows NT 3.51 or later. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329; www.microsoft.com. *Circle 456 on reader service card.*



When you click on the Edit button on the Internet Explorer toolbar, the current document in the browser opens in Word.

Lotus Development Corp.

BETA Word Pro 97

Although Word Pro 97 doesn't differ much from its previous release, don't think that Lotus's word processor is falling behind the times. When Word Pro 96 was first released, it was the most innovative word processor in many years, and it still leads its rivals in workgroup, versioning, and display features. Improvements in Word Pro 97 include increased performance, more stability, and enhanced document backgrounds.

Word Pro's tabbed document divider interface lets you organize multipart documents more intuitively than anything else on the market, and you can easily move sections, chapters, and inserted or linked objects like spreadsheets or images simply by dragging a tab. Lotus has added new or improved interface toolbars for features like tables of contents and cross-referencing. Word Pro, unlike Word and WordPerfect, never seems overloaded with features, but even experienced users will be frustrated by the complexity of creating and using macros, which you can't assign to keystrokes unless you learn the LotusScript programming language.

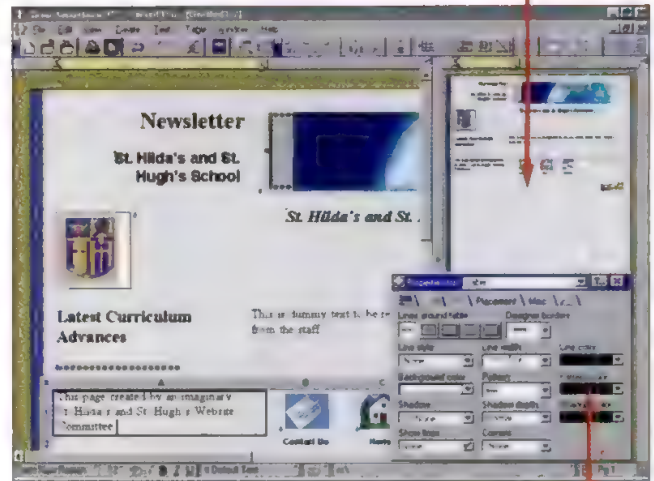
Like everything else in SmartSuite 97, Word Pro stands out for its workgroup

features. Security provisions for reading, editing, and annotating files are rich in detail and easy to use, and the TeamMail feature—a mail-routing system—can automatically send a receipt when each recipient on a mailing list opens your file.

Word Pro's intuitive frames let you insert text, graphics, or any other object. Text can flow between discontinuous frames on the same page or on separate pages. When you select a frame, it displays with lines connected to its anchor point, making frame-positioning especially easy to manage. The program's drawing tools match the advanced tools in Freelance Graphics 97, but unlike in Word and WordPerfect, you can't wrap text around an irregular graphic.

Internet features are more intelligently integrated than in rival word processors. A special dialog box opens or saves files on FTP or World Wide Web sites, and it lets you store lists of FTP sites by descriptive names. But Word Pro won't create a full

Word Pro's special views, such as this one, display reduced views of all pages along with a full-size view of the current page.



The InfoBox gives instant access to all formatting features applicable to the text or graphic under the cursor.

linked Web site like WordPerfect and, unlike Word and WordPerfect, it can't automatically create a link to the page currently displayed in your browser.

Web page templates include a toolbar for building HTML forms and provide good-looking starting points for creating your own pages, but the program can't automatically create a whole site of linked pages like WordPerfect's Website wizard. And unlike both Word and WordPerfect, it won't create a link to the site currently displayed in your Web browser.

Impressive and innovative as it is, Word Pro probably doesn't have the automation or depth of features needed to lure away much of the market for Word and WordPerfect. But any organization that needs the ultimate in collaboration, security, audit trail, and similar features will find Word Pro 97 the obvious first choice.

Word Pro 97. List price: \$105; upgrade, \$105. Requires: 486-based CPU or better, 8MB (for Microsoft Windows 95) or 16MB (for Windows NT 4.0) RAM, 46MB hard disk space, Windows 95 or Windows NT 4.0. Lotus Development Corp., Cambridge, MA; 800-426-7682, 617-577-8500; fax, 617-693-3512; www.lotus.com. Circle 457 on reader service card.

SUMMARY OF FEATURES

Word Processors

■ YES ■ NO

Products listed in review order

PC MAGAZINE
EDITORS' CHOICE

BETA

	Corel WordPerfect 7	Microsoft Word 97	Lotus Word Pro 97
Price	N/A	\$340, upgrade, \$85 (street)	\$105.00; upgrade, \$105.00 (list)
Timed backup	■	■	■
File management	■	■	■
Can search disk for filenames/text	■ ■	■ ■	■ ■
User can view a file before opening it	■	■	■
Macro language/Keystroke recorder	■ ■	■ ■	■ ■
Keyboard remapping	■	■	■
Glossary/address book	■ ■	■ ■	■ ■
Mail merge from address book/external database	■ ■	■ ■	■ ■
Can print mailing labels	■	■	■
Can process preformatted forms	■	■	■
Marks revisions on the fly	■	■	■
Includes group-editing notes with users' initials	■	■	■
Can store multiple versions in one file	■	■	■
Password protection	■	■	■
Wizard for creating Web sites	■	■	■
Creates HTML forms	■	■	■
Step-by-step on-screen demonstrations	■	■	■
Allows natural-language help questions	■	■	■

N/A—Not applicable: This product is sold only as part of a suite.

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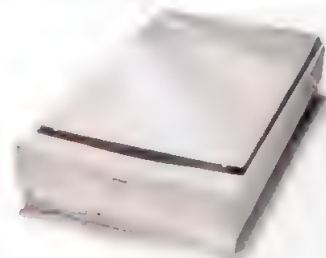
Or visit us at www.epson.com.

COMPARISON CHART

THE EPSON EXPRESSION 636

THE HP SCANJET 4C

Bit Depth	36	30
Colors	68.7 billion	2.0 billion
Maximum Resolution	4800 x 4800	2400 x 2400
Optical DPI	600	600
Grayscale Levels	4,096	1,024
SCAN SPEED-Preview	6 seconds	11 seconds
Color (4x5)	21 seconds	27 seconds
Grayscale	23 seconds	34 seconds
Text OCR	14 seconds	28 seconds



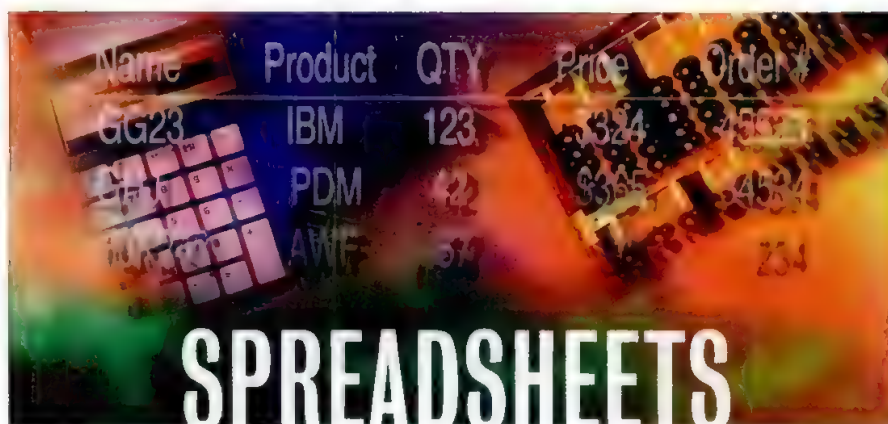
The Expression 636 executive PC bundle comes with Adobe Photoshop® LE, Xerox TextBridge Pro™ '96, NewSoft® Presto! PageManager® LE and SCSI interface and cable. As well as a competitive edge.

YOU'VE GOT TO SEE IT IN **EPSON** COLOR.

Product comparison based on independent third party testing using a 200 MHz Pentium computer with Windows 95. Scanners were operated in best quality mode using Adobe Photoshop TWIN drivers and SCSI cards included in the box. Images were single pass scanned at 400 dpi. Executive Mac bundle also available with Adobe Photoshop LE, e Paper™ and SCSI cable. Other scanner configurations available. Awards given to the ES-1200C, one in the line of Epson award-winning scanners. Do not scan published material without permission of the copyright holder. EPSON is a registered trademark of Seiko Epson Corp. Expression and TrueScan are trademarks of Epson America, Inc. All other trademarks are the property of their respective owners. ©1996 Epson America, Inc.

CIRCLE 048 ON READER SERVICE CARD





REVIEWS BY CRAIG STINSON

For all you number crunchers out there, products in the latest crop of spreadsheet applications have leaped to new heights of functionality. While continuing to calculate and process data, create charts and graphs, and evaluate layout presentation, the following spreadsheet programs also introduce sophisticated workgroup integration as well as novel tools for the Internet.

Corel Corp.

Corel Quattro Pro 7

In its early days, Quattro Pro succeeded by being completely compatible with 1-2-3 while staying several steps ahead of Lotus in the features race. Indeed, many worthwhile spreadsheet innovations appeared first in Quattro Pro, such as the ability to link worksheets in the DOS environment and the tabbed notebook metaphor we now take for granted in Windows. But now, as the product has been handed off from Borland to Novell to Corel, Quattro Pro has lost its aggressive spirit, at least temporarily.

Corel Quattro Pro 7, the first version to appear under Corel's banner, bears a redesigned menu system that makes it look and feel more like its suitemates WordPerfect and Presentations. Corel has also added support for PerfectScript (Corel's cross-application scripting language) and supplied equivalents to some recent 1-2-3 and Excel features: data mapping, support for Notes F/X, simplified text importing, the option of plain-English help inquiries, and the catching of common spelling errors on the fly.

Like Excel and 1-2-3, Quattro Pro can open tables from World Wide Web, FTP,

and Gopher sites. But your rights are read-only, so you cannot write information back to the Internet. Quattro Pro doesn't preserve hyperlinks in downloaded HTML data as Excel does, but you can create links by typing a URL as a formula into a cell. With a click on the standard toolbar, you can also create an on-screen macro button that updates the worksheet with information from a URL. And with a bit of PerfectScript code, you can create parameterized Web queries comparable with those available in Excel and 1-2-3.

PerfectScript is now more tightly integrated into Quattro Pro, allowing developers to write applications that link Quattro Pro with other members of the suite. For everyday productivity macros, you can set the recorder to transcribe your work in PerfectScript, or you

can record and edit the older Quattro Pro macro language.

With PerfectScript and a little programming expertise, you can also easily write your own custom functions, something that was beyond most users' skills in earlier versions. But you may not need to do so, because this release adds about 100 items to the library, including hyperbolic trigonometry functions and new bond-calculation functions.

Quattro Pro's most serious omissions concern workgroup support. The application does include a send command, which allows you to send a workbook as an attachment to a message. (Quattro Pro supports Digital Teamlinks, Novell GroupWise 4.1, WordPerfect Office 4.0, and all mail systems that use CMC or MAPI standards). But the program has no provision for sequential mailing and offers no way to send only a particular worksheet range. The consolidate command allows you to reassemble contributions from workgroup members, but it's not as easy to use as you'd like and is not as versatile as Excel's merge workbooks command or 1-2-3's TeamConsolidate command. Spreadsheet users who usually work collaboratively will be apt to find Quattro Pro frustrating.

For those who work primarily on their own, Quattro Pro may be a perfectly suitable number cruncher. But compared with the offerings from other vendors, it's just not the fire-breather it once was.

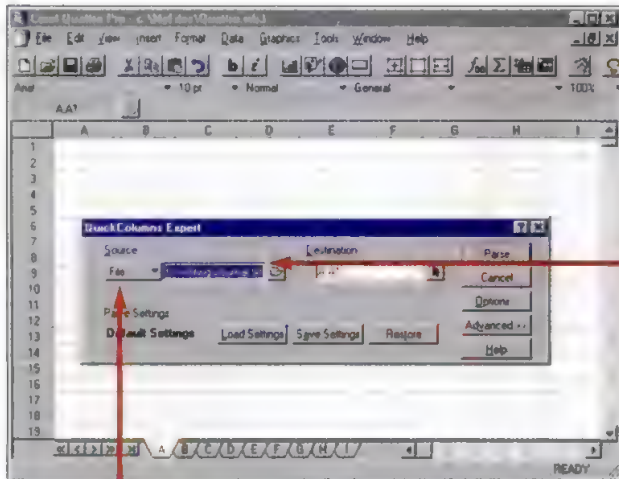
Corel Quattro Pro 7. List price: \$99.00; upgrade, \$49.95. Requires: 486-based PC or

SUITABILITY TO TASK: SPREADSHEETS



	Corel Quattro Pro 7	Microsoft Excel 97	Lotus 1-2-3 97
Application and model building	Excellent	Excellent	Excellent
Charting	Good	Excellent	Good
Worksheet presentation	Excellent	Excellent	Excellent
Applications development	Good	Excellent	Good
Workgroup integration	Poor	Good	Excellent
Internet tools	Fair	Excellent	Good

Analysis and model building refers to the program's tools for calculating and processing data, and **charting** concerns the program's ability to build graphs. For **worksheet presentation**, we evaluate layout and style controls. Under **applications development**, we look at the spreadsheet's programmability. **Workgroup integration** concerns the tools for creating, distributing, and reviewing spreadsheets in a group. **Internet tools** refers to the methods used for gathering data from the Internet and posting information to it.



Use these fields in Corel Quattro Pro 7's new QuickColumns Expert to specify source file and worksheet destination.

better, 16MB RAM, 30MB hard disk space, Microsoft Windows 95 or later. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-3733; fax, 613-728-9790; www.corel.com. *Circle 458 on reader service card.*

Microsoft Corp.

Microsoft Excel 97



The principal competitors facing Microsoft Excel 97 are Microsoft Excel 95 (also known as Excel 7) and Microsoft Excel 5. Convincing current customers to upgrade has become Microsoft's primary goal for Excel, toward which end the company has equipped the latest version with a well-rounded set of improvements.

Users who want to fetch data from the Internet or from a corporate intranet can take advantage of a new query feature. A Web query, coded in a plain-text Internet Query (IQY) file, attaches itself to Excel's Data menu; it can contain parameters for obtaining particular data from a Web site (a set of stock symbols, for example) or can prompt you for specifics when you make a Web connection. Excel comes with four sample IQY files, and others are available on Microsoft's Web site. (Quattro Pro and 1-2-3 can also generate parameterized Web queries, via their macro languages.)

To further the use of Web queries, Microsoft has provided support for some

new, spreadsheet-specific HTML tags. As a result, developers designing sites with Excel users in mind can feed Web-query target fields into an Excel Pivot-

Click here to indicate the kind of text you're importing.

Table or a filtered list. Like 1-2-3, Excel now allows reading at and writing to Internet sites, and it includes a special

toolbar to facilitate Web browsing. In addition, a new insert hyperlink command lets you plant links to the Web or local files in worksheet cells.

On the workgroup front, Microsoft has adopted a model that explicitly supports simultaneous file access for workers both on- and off-site: Excel permits multiple users to edit a shared file simultaneously. (By contrast, 1-2-3 restricts all but one user to read-only rights.) When different editors enter conflicting changes to a document, Excel either accepts the last one or displays a dialog box that lets the user who made the last change decide. A change-history feature records every edit with a user name and date, allowing an editor to restore original

You click here to edit Microsoft Excel 97's Internet Query (IQY) file.

cell values and letting those working alone track their own revisions. But Excel still lacks an easy-to-use, versatile scenario and version manager comparable to 1-2-3's.

Users can merge copies of a shared workbook with a new merge workbooks command. Excel resolves any conflicts using the same rules it employs for changes to a single file.

Excel's charting interface now fully aligns the menu system and chart wizard,

so that each wizard dialog box has an exact menu counterpart. As a result, you can now employ the menu system for both creating and editing charts.

In addition, PivotTables can now include calculated fields, and an external query operates as a separate thread, allowing you to continue working while tables are externally refreshed. Persistent formatting, structured selections, and correct sorting of dates take care of some petty irritations in previous versions' pivot tables.

You can also select charts for editing with a single click, and a clever bounding box appears around those worksheet cells that contribute to a selected data series, allowing you to expand, contract, or modify the series by simply dragging the box or its fill handle.

Microsoft Excel 97 is clearly the most richly endowed spreadsheet that you can purchase. But Excel 95 is arguably the second most richly endowed. Whether the new release is a compelling upgrade for you depends on whether you need its new features.

Microsoft Excel 97. Street price: \$340; upgrade, \$110. Requires: 486-based PC or better, 8MB (for Microsoft Windows 95) or 16MB (for Windows NT 3.51 or later) RAM, 22MB hard disk space, Windows

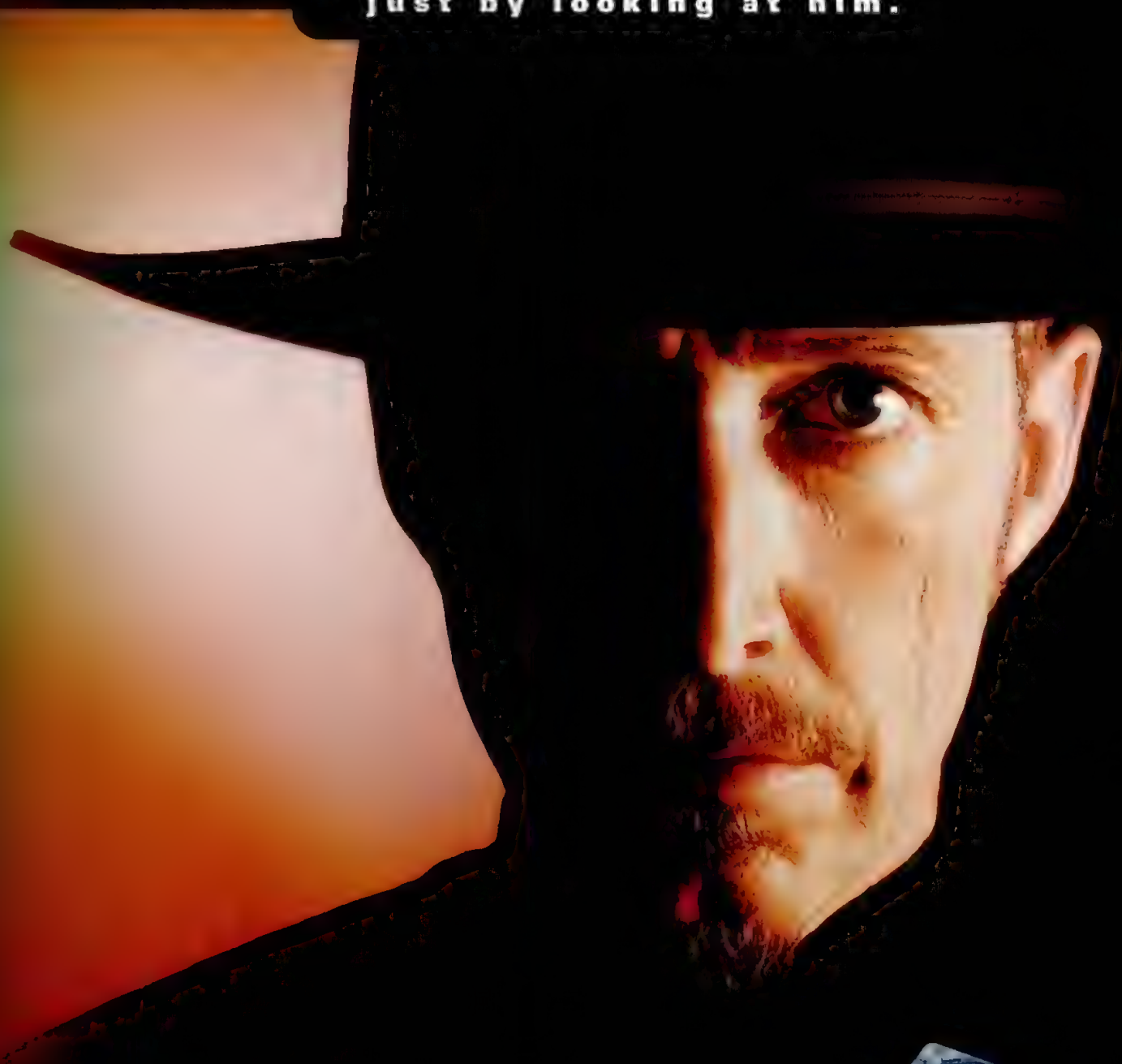
Symbol	Name	Last	Volume	Change
HLI	HEALTH IMAGES INC	15 5/8	201,000	2
EMC	EMCORP MASS	32 1/4	1,291,400	2 1/4
APR	AMERICAN PRECISION	18 1/4	16,000	0.75
TZHT	TRIZEC HAHN CORP LTD	3 3/8	10,000	0.25
NAB	NATIONAL AUSTRALIA	62 1/8	8,300	2 1/2
FUR	FIRST UNION RL EST ED	10 7/8	110,600	0.5
ACS	SMITH A O CORP	29 3/4	30,500	1
NA	N/A	N/A	N/A	N/A

Symbol	Name	Last	Volume	Change
MTG	MTG	10 7/8	110,600	0.5
ACS	SMITH A O CORP	29 3/4	30,500	1
NA	N/A	N/A	N/A	N/A

In order to refresh a particular data item, you click here.

95 or Windows NT 3.51 or later. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329; www.microsoft.com. *Circle 456 on reader service card.*

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BETA 1-2-3 97

A new SmartIcon palette provides shortcuts for these Internet activities as well as buttons for connecting to Lotus's own Web sites and a Web-search site. The tool-

These outline buttons let you control the amount of detail shown on the worksheet.

The most important changes to 1-2-3's



With LotusScript, you can now add your own functions to 1-2-3's library. Backward compatibility is somewhat less complete than in earlier versions. The classic menu box remains, of course, but about 20 of the verbs in Release 5's macro language do not exist in 1-2-3 97. (Lotus contends this version made them obsolete.) And the C API for add-in developers is gone, forcing third parties either to rewrite their add-ins in LotusScript or to drop support for 1-2-3. Although these bumps in the upgrade path for developers and add-in vendors somewhat diminish the product's appeal, Lotus has otherwise designed an attractively refurbished 1-2-3. **1-2-3 97.** Street price: \$329; upgrade, \$105. Requires: 486-based CPU or better, 8MB (for Microsoft Windows 95) or 16MB (for Windows NT 4.0) RAM, 25MB hard disk space, Windows 95 or Windows NT 4.0. Lotus Development Corp., Cambridge, MA; 800-426-7682, 617-577-8500; fax, 617-693-3512; www.lotus.com. *Circle 457 on reader service card.*

Spreadsheets

				
		Coral Quattro Pro 7	Microsoft Excel 97	Lotus 1-2-3 97
Products listed in reviewer order				
Price		\$99.00; upgrade, \$49.95 (list)	\$340; upgrade, \$110 (street)	\$329.00; upgrade, \$105.00 (list)
Supports Windows 95/NT		 	 	 
Number of functions		502	475	279
Maximum number of rows/columns		8,192, 256	65,536, 256	8,192, 256
Offers true 3-D				
Outliner mode				
Conditional formatting/Custom functions		 	 	 
Queries external ODBC sources				
Allows form-based input				
Allows data-validation without macros				
Crosstabs/Pivot tables		 	 	 
Provides filtered views of data				
Concurrent multiuser access				
Can mail and route ranges/files		 	 	 
Supports versioning/revision tracking		 	 	 
Integrated development environment				
Imports and exports .WK* and .XLS (through Excel 7) files				
Imports and automatically parses delimited and undelimited text				



REVIEWS BY SAL RICCIARDI

If you used to cringe when you heard the word database, cringe no more. The suites now have databases that are rather user-friendly but are still powerful. You can create simple and complex queries and build on your material by importing data. Then you can sort and make reports in nearly any way. You'll also find savvy new tools for managing data you send to and from the Internet.

Corel Corp.

Paradox

Once a sturdy product, Borland's Paradox seems to have withered recently. Although the program is not as impressive as the other suite databases reviewed here, faithful Paradox users may yet have hope thanks to Corel Corp. The company licensed the Paradox source code as of October 21 of last year and has assumed full responsibility for development, marketing, sales, and support of the Paradox family of products worldwide.

Because Borland developed Paradox, users of Corel Office Professional 7 will find a program with little resemblance to its suitemates. Paradox's development language, called ObjectPAL, is also the odd man out, since PerfectScript is Corel Office Professional's primary programming vehicle.

Corel plans to address some of these issues in the next release, which will also provide Internet features and support for Borland's popular Delphi development tool. Right now, Paradox's Internet support consists only of ActiveX controls, which you can use to add third-party Internet support to your Paradox applications. Both Approach and Access support

this capability as well.

Paradox uses the Borland Database Engine (BDE), which has native support for the Paradox and dBASE file formats and can support SQL databases through Borland's SQL-Link drivers or ODBC. The product supports a broad selection of field data types when using the Paradox file format, including short- and long-integer, money, formatted-memo, binary, graphic, and OLE types. An Autoincrement type is included, and Paradox correctly handles data imported into such a field.

Among the graphical design tools you'll find ample use of dockable toolbars, right-click property sheets, and tabbed dialogs. Paradox's useful Object Explorer, similar to Approach's Infobox, lets you quickly and easily inspect meth-

ods, events, and properties. The program's experts, similar to Access 97's wizards or Approach 97's assistants, walk you through completing some tasks and complement the design tools.

When you start Paradox, you're greeted with the Startup expert, which lets you create, open, or generate a database. Choosing the latter brings you to the Database expert, which generates complete applications from predefined templates. We were impressed with the quality of these sample applications, which include a multitable business-contact manager that demonstrates how to use notebook pages (Paradox's tabbed dialogs).

For searching, though, Paradox's once-innovative query-by-example editor no longer leads the pack. Though you can still create advanced queries by supplying sample values and linking fields, we found it cumbersome compared with Access 97's Query Designer.

Paradox has a highly capable development environment and a robust, object-based programming language in ObjectPAL. But learning ObjectPAL and the Paradox event model requires skill and a significant investment in time and effort. Essentially, Paradox is a product in transition. For now, it's mostly a developer product and is not as accessible as the other programs here. As a suite database, it's probably not your best choice at this time.

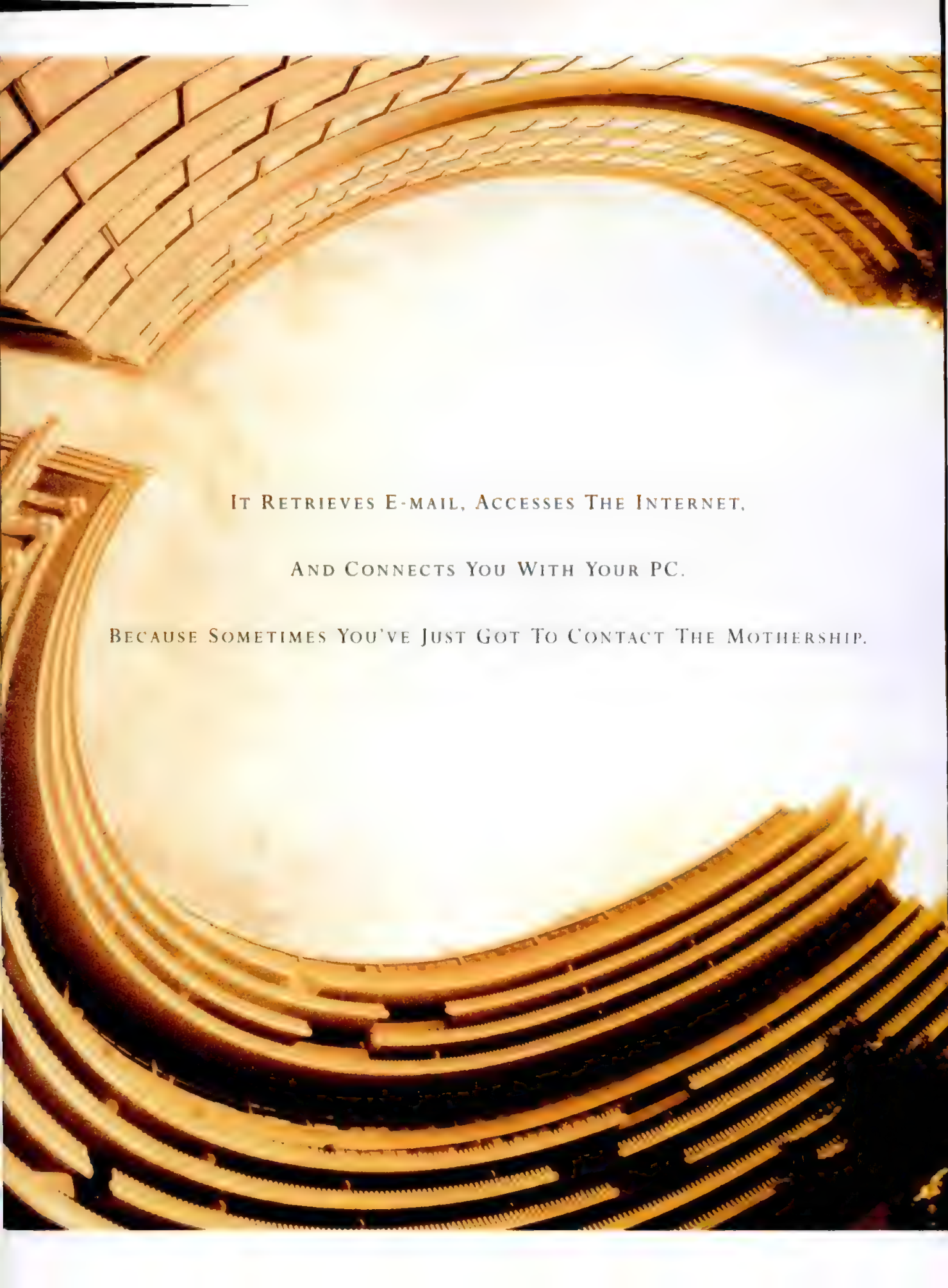
SUITABILITY TO TASK: DATABASES



	Paradox	Microsoft Access 97	Lotus Approach 97
General database	Good	Excellent	Good
Forms	Good	Excellent	Excellent
Query and analysis	Good	Excellent	Excellent
Reporting	Good	Excellent	Excellent
Rapid application development	Good	Excellent	Good
Connectivity	Good	Excellent	Excellent
Internet	N/A	Good	Fair

N/A—Not applicable: The product does not perform this task.

General database concerns the basic tools for creating tables, interacting with data and structures, and importing records. **Forms** involves the tools for creating a data entry structure and viewing screens, and **query and analysis** involves the construction of simple and complex queries. **Reporting** reflects the creation of various report types. **Rapid application development** refers to front-end creation and application building, and **connectivity** concerns the links to data in various file formats. **Internet** involves the tools for publishing static and dynamic documents to the Internet and for retrieving and entering data from it.



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access

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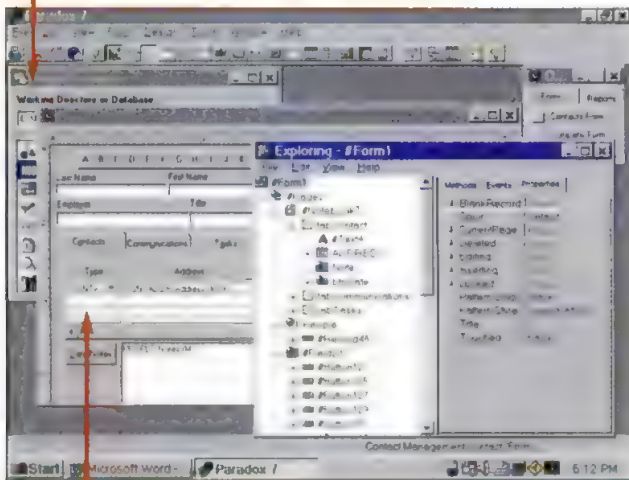
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Paradox's Project Viewer provides a central point for accessing forms, reports, queries, and other database objects.



Among other features, the Database expert generates this sample contact management application.

link/attach to an HTML table. This release also adds a native hyperlink field type that can link to HTML files or Office documents whether stored locally or on the Internet.

Access 95 pioneered the appearance of replication in a desktop database product. The latest version extends this feature to the Internet, so you can keep your replica databases in sync using FTP. A new partial-table replication feature lets you replicate a selected set of records rather than a whole table. And the program's exceptional database engine, Microsoft Jet, supports many relational database necessities, such as real primary and foreign keys and advanced features like updatable views. Because all access to data in an Access database comes through Jet, and because Jet always enforces the validation rules, these rules can't be bypassed. This helps ensure the integrity of your data, even when access comes through external sources.

The form and report design tools in

Access are first-class. Tabbed property sheets, click-and-draw control palettes, drag-and-drop field lists, and right-click pop-up menus characterize the designers, while Microsoft's wizards and the AutoForm, AutoFormat, and Auto Report features do most of the work for you. All forms begin life now as "light-weight" forms to enhance performance. This means a form won't have a Visual Basic module for applications attached until you write some code and it becomes necessary. Also new is Microsoft's Office Assistant, a component shared with other Office 97 applications. The Assistant accepts your plain-English questions and offers help, and then drops in occasionally to offer tips or explanations.

Access includes a powerful suite of query facilities. For simple searches, you can use Filter By Form to turn your form into a template for requesting matches. Next is Filter By Selection, which lets you highlight the text you want to match. The advanced query facility lets you fill in the query design view with search criteria and graphically join tables for multitable queries. There's also Filter By Input, which lets you right-click and enter search criteria in a text box on the resulting menu.

SUMMARY OF FEATURES

Databases

■ YES ■ NO

Products listed in review order

	Paradox	Microsoft Access 97	Lotus Approach 97
Price	\$299.00; upgrade, \$49.95 (list)	\$340; upgrade, \$110 (street)	\$109.00; upgrade, \$105.00 (list)
Maximum fixed-length/variable-length field size	255, unlimited	255, 65,535	255, 32,768
Integer/floating-point fields	■	■	■
Currency/autonum fields	■	■	■
Date, time, and Boolean searches/OLE object-field type	■	■	■
Imports/exports native ODBC and SQL	■	■	■
Imports/exports Lotus Notes databases	■	■	■
Automatically generates indexes/Supports multifold indexes	■	■	■
Can remove indexes	■	■	■
Can enforce uniqueness/required field/formula-based verification	■	■	■
Supports ActiveX/VBX controls	■	■	■
Supports query by form/example	■	■	■
Accepts and generates SQL syntax	■	■	■
Supports filter by selection/by input	■	■	■
Maximum number of multicolumn sorting levels	16	255	255
Macro language/Keystroke recorder	■	■	■
Supports default values/hyperlink field type	■	■	■
Can import HTML tables and lists to database tables	■	■	■
Can link and attach to HTML tables or lists	■	■	■
Can export static tables, reports, and forms to HTML	■	■	■
Supports dynamic access to database via the Web	■	■	■

Microsoft Corp.

Microsoft Access 97



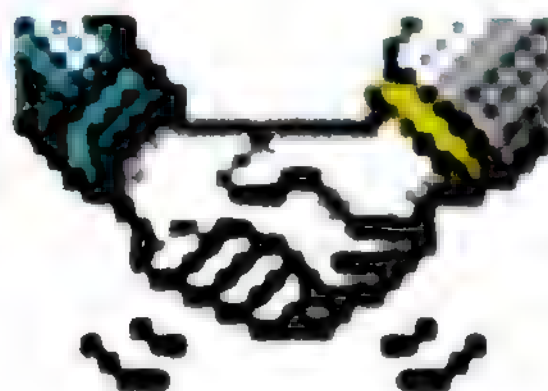
With professional power, superb tools, and excellent integration with Microsoft Office 97, Microsoft Access 97 leads the pack in databases as the worthwhile choice for novice users or expert programmers.

Access's new Internet support lets you output tables, queries, datasheets, forms, and reports to static HTML files, with or without using a template. You can also send your output to a Web server and Access will provide a mechanism for creating live Web output. You can output database objects to dynamically updated live views on Web sites hosted by Microsoft's Internet Information Server or Personal Web Server. For moving in the other direction, you can import data from HTML tables or

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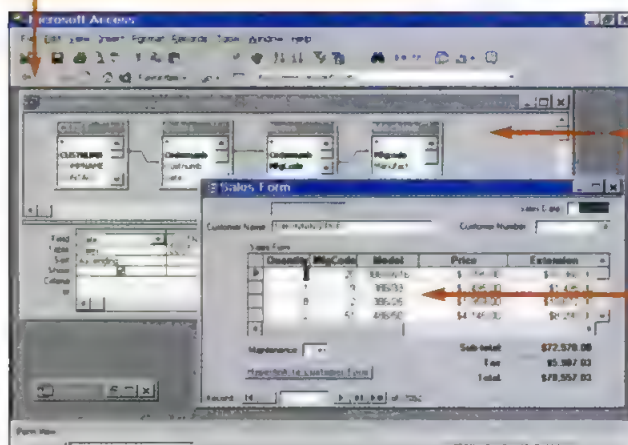
The new Microsoft® BackOffice™ is a different approach to server software solutions. Not just a shrink-wrapped product, BackOffice is a big, wide family of servers, each designed with the Internet in mind, all designed to work together. This means you can choose from the broad range of BackOffice server software to assemble the best solution for your business — one that augments what you already use, extends your organization to the Internet and

remains open to the future. And because all the BackOffice products are based on Microsoft Windows NT® Server, you know they will work independently and integrate flawlessly. So what Microsoft BackOffice gives you is more than a bunch of server software products — it's a comprehensive strategy for implementing easy-to-use, easy-to-manage server solutions across your entire organization. Or, as the French would say, "Savoir-faire is everywhere."

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Microsoft Access 97's Web toolbar provides one-click access to Internet features.



The Query Design window makes creating simple or complex queries a snap.

You can create one to many forms using subforms, such as the order form shown here.

206-936-7329; www.microsoft.com. Circle

For developers, Access offers an enhanced Visual Basic for Applications language and development environment. All in all, Access impressively combines industrial-strength database power with amazing ease of use.

Microsoft Access 97. Street price: \$340; upgrade, \$110. Requires: 486-based PC or better, 12MB (for Microsoft Windows 95) or 16MB (for Windows NT 3.51 or

later) RAM, 28MB to 60MB hard disk space, Windows 95 or Windows NT 3.51 or later. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax,

and reporting tasks.

The program incorporates many of SmartSuite 97's Internet features. First is the Internet SmartIcon Palette, which provides one-click access to Approach's Internet features, Lotus Web pages, and the Lotus FTP server. You can distribute Approach 97 applications to the Internet (or an intranet) as compact .APT files that include both views and data, and other Internet users can open them as read-only. You can also use the program to develop Web applications that access live data stored in DB2 databases using IBM's Net.Data Internet technology. And you can save forms, reports, and worksheets as static HTML files to your local disk or to an FTP server.

You can attach validation rules to your database that Approach will enforce. On our tests, though, we found that Approach doesn't enforce the validation rules during importing. Approach also doesn't support an integral Autonum field type, as do the other databases considered here, but you can emulate one by choosing the serial-number option and supplying a starting value. On our tests, Approach failed to supply an appropriate starting value for data imported into a serial number field. We had

456 on reader service card.

Lotus Development Corp.

BETA Approach 97

In the latest iteration of its database product, Lotus has expanded Approach's data-access versatility to the Internet while continuing to build upon its ease of use for the most common data entry, query,

PERFORMANCE TESTS

Databases



Although our test data set was four times as large as the one we used for our last database story, we found surprising parity among query speeds. But while Access maintained this speed, Approach stumbled on updates, and Paradox fell short in reporting.

What the Numbers Mean

Unlike Paradox and Microsoft Access 97, Lotus Approach 97 does not let users specify which fields will be indexed. Instead, when a query is performed on a nonindexed field, the program automatically creates what Lotus calls a

Smart Index. Queries on nonindexed fields were slower than those of the competition, but keep in mind that the user will receive this result exactly once. Thereafter, the field will be indexed, and performance will be extremely fast. Fields need not be

unique for indexing. One minor downside of Approach's indexing strategy is that excess disk space may be used by indexes created on infrequently queried fields.

Like Approach, Access can index nonunique and unique fields, but the user must explicitly specify which fields are to be indexed. Paradox can create only primary indexes on unique fields or combinations of fields. So while Approach and Access indexed our detail table on the single, nonunique SERIES_ID field, Paradox required indexing on this field, as well as the YEAR and PERIOD fields. Paradox required considerably more tweaking to optimize performance than the other two applications.

Users will commonly repeat tasks during a session, so we ran each test twice after rebooting. The charts presented here show

INDEXED FIELD QUERY

NONINDEXED FIELD QUERY

	Single Table Seconds	Relational Seconds	Single Table Seconds	Relational Seconds
Paradox	1	1	9	6
Microsoft Access 97	3	3	10	5
BETA Lotus Approach 97	1	2	18	6
	◀ BETTER	◀ BETTER	◀ BETTER	◀ BETTER

to determine manually the highest number used and set the starting value to one higher. Lotus acknowledges this inconvenience and the need to fix it.

On the plus side, Approach comes with SmartIcons that grant single-click access to the features you use most, a standard SmartSuite status bar that provides at-a-glance program status and quick pop-up menu mode changes, and over 50 SmartMaster applications and database templates. A tabbed interface makes switching between views fast and easy, and the design tools are modern and capable. We easily designed a sales order form with a repeating panel for line items and created the required calculated fields for the invoice totals.

The product's Assistants make creating reports, labels, envelopes, and form letters simple. For searching, Approach lets you turn a form into a fill-in-the-blanks-style query, or you can use the handy Find and SQL Assistants to walk you through more complex multitable, multicolumn queries. In addition, LotusScript, an object-based scripting language common across SmartSuite 97 applications, supplements Approach's

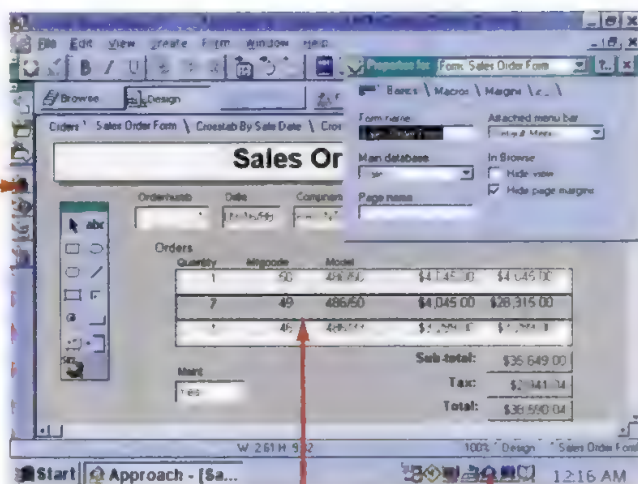
traditional point-and-click macro facility. And you can now record and generate

The Internet SmartIcons Palette provides fast access to Approach's Internet features.

scripts based on user actions.

All told, Approach integrates smoothly with SmartSuite 97, but it concentrates more on data access and ease of use rather than core database engine features. As a result, it's more suited to simple personal applications, quick-and-dirty browsing, or editing of any of its supported file formats. Unlike Access, it's less suited to building office-critical business applications where data integrity and security is of the utmost concern.

Approach 97. List price: \$105; upgrade, \$105. Requires: 486-based PC or better, 8MB (for Microsoft Windows 95) or 16MB (for Windows NT 4.0) RAM,



You can easily create forms with repeating panels for line items and calculated invoice totals. And in the bottom-right area, the SuiteStart utility provides one-click access to Approach from a tray icon.

20MB hard disk space, Windows 95 or Windows NT 4.0. Lotus Development Corp., Cambridge, MA; 800-426-7682, 617-577-8500; fax, 617-693-3512; www.lotus.com. Circle 457 on reader service card.

the time to complete the task the first time the test was executed. Typically, we observed between a twofold and fivefold improvement on the succeeding run.

How We Tested

Our database tests used data made available by the Bureau of Labor Statistics. The specific data set we used was State and Area Employment, Hours and Earnings, for a few selected states. We retrieved data from the bureau's Web site at www.bls.gov. The data consisted of eight tables: a 33,000-record lookup table that had a one-to-many relationship to an additional, 230,000-record detail table and six small lookup tables ranging in size from 7 to just over 500 records. The smaller tables further refined the information in the large lookup table. Each lookup table had a unique primary key field. There were

no unique fields in the detail table.

We performed all testing under Microsoft Windows 95 on Gateway 2000 P5-120 systems (Pentium/120-based computers). Each system was equipped with 16MB of RAM, a 1.6GB Western Digital EIDE hard disk, and an STB Lightspeed 128 graphics adapter set to 800-by-600 resolution with 256 colors.

The **Indexed Field Query—Single Table** test searches the large detail table for 167 records containing a specific series ID. The **Indexed Field Query—Relational** test specifies criteria in the large lookup table and requires a database to find 172 records in the large detail table. The **Nonindexed Field Query—Single Table** test finds 164 records in the large detail table based upon a number in the nonindexed value field of the same table. The **Nonindexed Field Query—Relational**

test uses a nonindexed field in the large lookup table to return 204 records. The **Columnar Report** test (results not shown) joins three tables and presents 158 records from the large detail table with associated values from one of the small lookup tables. It then presents them in a sorted columnar report. Because of space limitations, we did not print the results of the Columnar Report test. But results were consistent with those of **Report with Summaries** test, which groups and subtotals the same results by two fields. The **Update—Indexed Field** test changes the series ID in all 172 records found in the Indexed Field Query—Relational test. Similarly, the **Update—Nonindexed Field** test changes the series ID field in the 204 records found in the Nonindexed Field Query—Relational test.

Bear in mind that our tests exercise the speed of a program's database engine, and not a program's interface. Therefore, though one program may execute a query or report faster than another, the steps required to execute such a process may negate any performance advantage. —Analysis written by Ben Z. Gottesman

UPDATE		
Report with Summaries	Indexed Field	Nonindexed Field
Seconds	Seconds	Seconds
32	2	7
5	2	4
7	16	75
◀ BETTER	◀ BETTER	◀ BETTER



REVIEWS BY WAYNE KAWAMOTO

Presentation graphics packages, the most recent staple in suites, come with even more guidance in the form of wizards and templates, more output options, more ways to create stunning presentations, more workgroup features, and more integration with multimedia and the Internet. You can even make the most of your spreadsheet and word processor files by incorporating their content into your presentations.

Corel Corp.

Corel Presentations 7

If you purchase Corel Office Professional 7, you'll probably find that its presentation graphics product, Corel Presentations 7, can suffice. But if you want song-and-dance suite presentations, the Corel offering definitely places third among the three major packages.

Creating simple presentations in Corel Presentations 7 is a straightforward process. Here, you simply choose from a selection of attractive slide templates, layouts, and backgrounds, then enter your data. While the basic interface lacks the general polish of Lotus's Freelance or Microsoft PowerPoint, the program prompts you adequately, indicating where you should type in your data.

On our tests, it took substantially longer to create our simple presentation with Presentations than with Freelance, the most intuitive package, or with PowerPoint, the most robust program. For example, when importing data into graphs, the program asks you for ranges that you wish to plot, but it doesn't show you the table. And because Presentations works clumsily with lines and arrows, we

also edited considerably—more than in the other packages—on our graphs to get our intended effects. And despite enhancements designed to make creating and working with organizational charts easier in Presentations, these tools don't match the ease of those found in Freelance, where you quickly enter names and titles, and then arrange them.

Presentations offers adequate content templates to provide a framework for different types of business presentations. But the program limits its templates to a few topics. And in terms of multimedia, Presentations is the only one of the three packages that doesn't directly support video playback (except through OLE, which isn't as straightforward to use). On the plus side, however, Presentations comes with some 40 new attractive screen transitions. The well-

designed interface makes it easy to assign transitions to slides and animations to slide objects.

Like the other vendors, Corel offers powerful capabilities when you want to assign events or actions to slide objects. Here, you simply right-click objects to reveal menus and then assign sounds or move actions to go to other slides. You can also program keystrokes that perform similar functions.

Presentations can also convert presentations into HTML via a well-done Wizard-like interface. With this program, you can create Web documents that contain frames or multiple pages, and the final HTML document retains your presentation's links. You can also assign objects to launch other Web sites.

The program's output was mixed. When we chose to print backgrounds, the laser printouts featured smooth gradients, but some of the text was unreadable because the program didn't alter gray scales for contrast, as the other packages did.

Despite the fact that the package does not include—nor lets you control—video, you'll find that Presentations' features often resemble those found in Freelance and PowerPoint, albeit with less speed and innovation. In the end, Presentations still manages to hold its own in a competitive market.

Corel Presentations 7. List price: \$99; upgrade, \$49.95. Requires: 486-based PC or better, 8MB RAM, 22MB to 144MB

SUITABILITY TO TASK: PRESENTATION GRAPHICS



Corel
Presentations 7



Microsoft
PowerPoint 97



BETA
Lotus Freelance
Graphics 97

	Corel Presentations 7	Microsoft PowerPoint 97	Lotus Freelance Graphics 97
Content creation	Good	Excellent	Excellent
Presentation guidance	Good	Excellent	Good
Multimedia integration	Good	Excellent	Good
Output	Good	Excellent	Excellent
Workgroup integration	Poor	Good	Excellent
Web integration	Fair	Excellent	Good

Content creation concerns the creation, gathering, and management of text and graphics, and **presentation guidance** refers to the help tools and templates. **Multimedia integration** reflects the integration of audio, video, and animation. **Output** involves printing or displaying (or both) using various media, and **workgroup integration** refers to a group's creation, distribution, review, management, and presentation of documents. **Web integration** concerns the ability to create Web content and use the Internet.

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Use these buttons to switch between slide, sorter, and outline views. You'll also find a full palette of drawing tools below.



Corel Presentations 7 offers templates that ask you to double-click to enter your data.

hard disk space, Microsoft Windows 95 or Windows NT 3.51 or later. Corel Corp., Ottawa, Ontario, Canada; 800-772-6735, 613-728-3733; fax, 613-728-7970; www.corel.com. *Circle 458 on reader service card.*

Microsoft Corp.

Microsoft PowerPoint 97



Whereas the previous version of PowerPoint felt largely like a port to the new Windows 95, Microsoft PowerPoint 97 comes armed with strong built-in HTML translation capabilities and impressive features for building standalone multimedia presentations. Add a first-rate interface, Microsoft's excellent on-line help, and a comprehensive and innovative feature set and you'll find PowerPoint a truly worthy product.

PowerPoint's built-in HTML translation lets you export your presentations as Web documents instead of relying on the Internet Assistant add-on. To perform the conversion, a wizard serves up options (such as layout type and button colors) and graphically shows your progress. PowerPoint can also link objects with URLs. As a plus, it can save presenta-

tions into a special file that retains each slide's transitions, sounds, and video effects. To view such a file on the Web, users have to install a plug-in, PowerPoint Animation Player (available with Office and downloadable from Microsoft's Web site).

Like the other presentation packages covered in this story, PowerPoint offers templates that let you simply enter data into attractive, professionally designed slides. To enhance your presentations even more, PowerPoint comes with a generous collection of clip art (applicable to the entire suite), and you can download more from Microsoft's Web site Clip Gallery Live. The program also does an excellent job of previewing graphics before you import them.

In addition, PowerPoint can customize a presentation for different audiences without resorting to multiple files, and it helps you rehearse and time your presentations. And the AutoContent templates rank as the most detailed and helpful (although Freelance tends to offer more selection). To help you use them as a starting point for your presentations, PowerPoint offers a wizard that steps you through the process. The program also has multimedia

A wizard guides you through the process of translating a presentation into HTML.

features that allow you to create interactive, standalone presentations, notably a tool for adding buttons that look as if they depress on-screen.

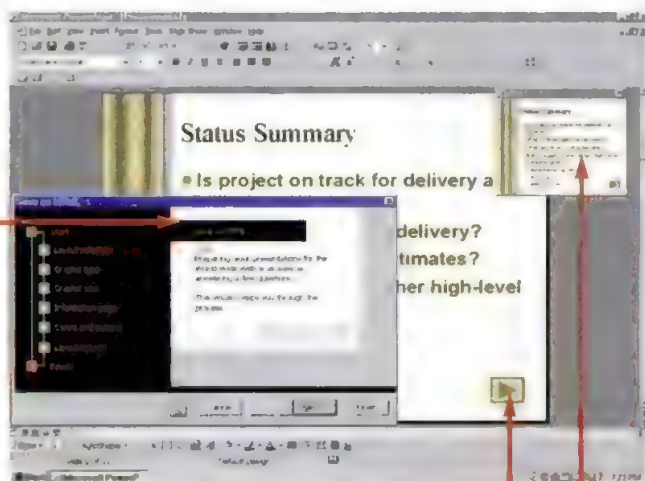
PowerPoint does a good job of working with data tables as well. Asking you for the number of rows and columns be-

fore you enter data, it lets you enter text by just tabbing to each cell instead of having to change rows. In a welcome enhancement that originally appeared in Freelance, PowerPoint also displays thumbnail slides in your outliner, so you can view an entire slide as you make changes to it.

Although PowerPoint lacks print preview, our black-and-white laser printer produced attractive output with smooth gradients and fonts, and the text was quite readable in gray-scale form. And if you need to take your show on the road, Pack and Go Wizard conveniently copies your presentation and all necessary files to floppies so you can readily install on another system.

Freelance retains a slight edge in ease of use and group support, but PowerPoint is the strongest at setting up and displaying multimedia and creating interactive, standalone presentations. When you need to make your point, particularly with multimedia, this is definitely the way to go.

Microsoft PowerPoint 97. Street price: \$340; upgrade, \$110. Requires: 486-based PC or better, 8MB (for Microsoft Windows 95) or 16MB (for Windows NT 3.51) RAM, 26MB hard disk space, Windows 95 or Windows NT 3.51. Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; fax, 206-936-7329; www.microsoft.com. *Circle 456 on reader service card.*



A helpful preview window shows transitions and animations. PowerPoint also creates buttons for standalone, interactive presentations.

Lotus Development Corp.

BETA Freelance Graphics 97

Despite lots of competitive heat from Microsoft PowerPoint 97, Lotus's Freelance Graphics 97 is the easiest product to use by a slight margin, and it does the best job of supporting workgroups. But for a presentation graphics package with superior multimedia features, look to PowerPoint, our overall winner.

In its prior release, Freelance emerged as the first presentation package to let you convert presentations into HTML, building title screens with tables of contents. Now it supports much-needed Netscape Navigator frames and will offer a welcome plug-in player so browsers can display transitions and videos as well as play sound effects. Netscape Navigator easily read Freelance's HTML presentations, which maintained all internal presentation links. And now you can set objects to launch URLs and use the improved TeamShow feature to deliver slide shows via the Internet.

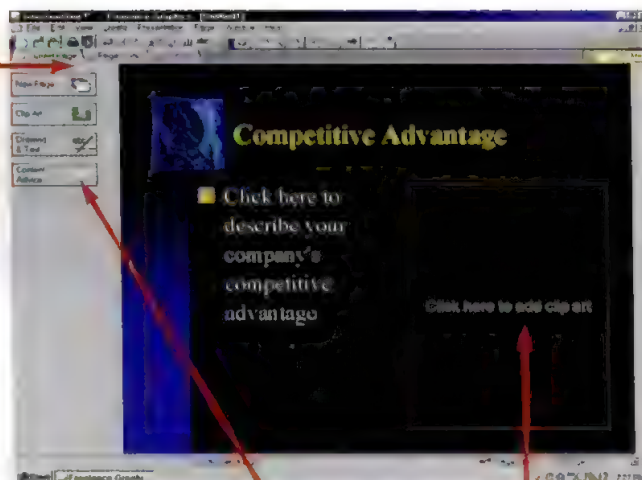
Once again, Freelance's slick SmartMasters let you simply, intuitively, and quickly create a presentation look and add data with one click. The efficient interface includes icons that let you increase and decrease font sizes, a draw palette that appears when you click an icon, and a tabbed interface for switching between the slide, sorter, and outliner views. Right mouse

Tabbed folders in Freelance Graphics 97 let you quickly switch between slide, sorter, and outline views.

clicks brings up useful menus for editing objects and applying settings.

Freelance offers a variety of connectors and shapes for creating and editing organization charts and other diagrams. But it lacks PowerPoint's flexibility in arranging layouts. Furthermore, some functions, such as adding logos or "click here" areas, weren't working for master slide creation, and Freelance performed poorly when we imported text outlines and converted them into presentations. Lotus plans to have fixed these bugs in Freelance's gold version.

On the other hand, Freelance provides fairly powerful authoring capabilities. You simply right-click on an object, and then assign an action or a “goto” to move to another slide. Freelance doesn’t include a true button tool like the one in PowerPoint, but you can fairly easily group basic text and graphics to create



A clean interface with buttons brings up other palettes when you need them. You can also add data to the SmartMasters.

SUMMARY OF FEATURES

Presentation Graphics

FEBRUARY 18, 1997 PC MAGAZINE 169

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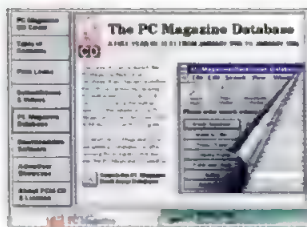
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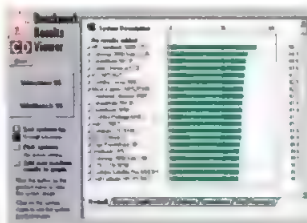
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PC Tech

THE DEFINITIVE GUIDE TO PC TECHNOLOGIES & TOOLS

POWER PROGRAMMING

Windows-to-Unix Sockets

Use Berkeley sockets for a more direct connection.

By Zan Oliphant

As a software consultant specializing in Internet communications, I am frequently asked to provide a communication path between a client Windows machine and a Unix server. Many start-up Internet software companies are basing products on the client/server paradigm for everything from advertising to gaming.

Although Web browser plug-ins coupled with CGI programs can satisfy many needs, it's often necessary to bypass the

Web model altogether and use a more direct method of communication: Berkeley sockets.

This article will show you how to code a Unix server in conjunction with a Windows 95 client, using Windows and Unix socket implementations. The source code for the example can be downloaded from PC Magazine Online. The Unix code, written in C, can be compiled under most flavors of Unix using the cc compiler that is standard with any Unix implementation. The Windows code, written in C++, will compile under any Windows 95 GUI compiler.

You're probably aware by now that the Internet as it stands today is based mainly on the Transmission Control Protocol (TCP) and the Internet Protocol (IP). Though there are other protocols in the Internet suite, we as programmers are mostly concerned with those two, collectively known as TCP/IP. In the early 1980s, a further layer of abstraction and

IN THIS SECTION



TUTOR Our crash course in Microsoft Visual C++ programming continues, this time showing you how to display a grid for a tic-tac-toe game board and how to get your program to detect mouse clicks. *Page 179.*



OPERATING SYSTEMS OS/2 Warp 4.0 brings speech recognition to the PC. Based on IBM's VoiceType technology, the feature takes advantage of the company's new Direct Audio RouTines (DART), and it doesn't even require any special hardware components. *Page 181.*



INTERNET TOOLS Internet telephone software offers the prospect of being able to have a conversation with someone anywhere in the world at the cost of a local call. But the hurdle of incompatible standards has yet to be surmounted. Find out how protocols from the ITU and the IETF are working to overcome the babel. *Page 185.*



UTILITIES TrayLaunch is a Windows 95 program that lets you access any icon faster by adding its own icon to the tray on the right side of the Taskbar. It can even handle the built-in system utilities My Computer and Recycle Bin. Tray Launch also demonstrates how programmers can place objects in the Taskbar tray. *Page 191.*

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simplification was added by Berkeley Software Distribution's flavor of Unix (BSD Unix). That layer, *sockets*, is still in wide use today on a plethora of hardware platforms. Winsock, the Windows version of Berkeley sockets, is the basis for all your favorite Windows Internet applications, such as Web browsers and FTP and telnet implementations.

Microsoft recently extended the original Winsock 1.1 specification with a new version, called Windows Sockets 2. The superset of Winsock 1.1 adds support for other protocols, in addition to TCP/IP. For the purposes of this article and its associated example, we'll use Winsock 1.1.

Our example contains source code for a Unix server using BSD sockets and a Windows 95 client using a Winsock. The Unix server creates a socket, binds it to a local address, and listens for connections on a predefined port. When a client attempts to connect to the port, the server accepts the connection and creates another process to service the client. Then the new server process talks with the client, using a predefined protocol.

On the Windows client side, things are a bit more complicated, largely because the original Winsock implementation was based on a single-tasking, event-driven platform—Windows 3.1. The Winsock designers allowed for asynchronous socket functions with a window procedure that received socket events. In many cases, the same window procedure is used for the main application window. While Windows 95's multiple threads allow for a purer BSD-type socket design, most Windows developers still use the window procedure technique in order to maintain compatibility with Windows 3.1. Using the Windows client design in our example code, we get local and remote IP addresses, create a new socket, bind that socket to a local port and address, and wait for Windows messages notifying us of a connection and new data.

If all this is Greek to you, keep reading. I'll explain more as we step through the code.

THE UNIX SERVER

The server code is a generic BSD socket implementation. The first thing it does is create a socket using the system call `socket`, which is prototyped as

```
int socket (int family, int type,
            int protocol);
```

The `family` argument is one of the following (the `AF_` prefix stands for *address family*):

<code>AF_Unix</code>	Unix internal protocols
<code>AF_INET</code>	Internet protocols
<code>AF_NS</code>	Xerox NS protocols
<code>AF_IMPLINK</code>	IMP link layer

The socket type is one of the following:

**Winsock is the basis for
all your favorite Windows
Internet applications,
such as Web browsers
and FTP and telnet
implementations.**

<code>SOCK_STREAM</code>	stream
<code>SOCK_DGRAM</code>	datagram
<code>SOCK_RAW</code>	raw
<code>SOCK_SEQPACKET</code>	sequenced packet
<code>SOCK_RDM</code>	reliably delivered message

The `protocol` value is set to 0 for most user applications. Other protocols may be specified, such as raw or UDP, but that is beyond the scope of this article.

The system call `socket` returns an integer value, which is known as a *socket descriptor* and is very similar to a file descriptor. You'll use it later for reading from and writing to a given socket. Our code example calls `socket` with the following parameters:

```
sockfd = socket (AF_INET,
                 SOCK_STREAM, 0);
```

After a socket is successfully created, we must bind the newly created socket to a local IP address and port. The system call that does that is `bind`, whose prototype is as follows:

```
int bind (int sockfd, struct
          sockaddr *myaddr, int addrlen);
```

`bind` takes `sockfd`, the socket descriptor created previously, along with a pointer to and the size of an address structure. For our example, the address structure is filled with the address family, the local IP address, and the port:

```
serv_addr.sin_family = AF_INET;
serv_addr.sin_addr.s_addr = htonl
(INADDR_ANY);
serv_addr.sin_port = htons
(SERV_TCP_PORT);
```

Here the address family is `AF_INET`, the local IP address is the system constant `INADDR_ANY` (for any IP address), and the port is set to the program-defined constant `SERV_TCP_PORT`. The port value to which the example server will listen is an arbitrary 16-bit value between 1,024 and 65,535. (Many ports below this range are reserved by Unix,

so it is best to stay above 1,024.) Any client application attaching to our server will also need to know this port. The server code calls `bind` in this way:

```
bind (sockfd, (struct sockaddr
          *)&serv_addr, sizeof (serv_addr));
```

Also notice in the above `serv_addr` structure that `INADDR_ANY` and `SERV_TCP_PORT` are translated using `htonl` and `htons`. These calls are abbreviations for *host to net long* and *host to net short*. They are used to convert integers to *network byte order*. To translate in the reverse direction, you can use `ntohl` for *net to host long* and `ntohs` for *net to host short*. *Byte order* refers to how a specific type of hardware stores multibyte integers.

For example, an Intel-based PC stores a 4-byte integer with the least significant byte first—commonly called *little endian*—whereas a Motorola processor stores the most significant byte first (*big endian*). Network byte order is big endian and was established as a common order for communicating on a network. If you are programming for a machine that just happens to use network byte order as its native format, you don't really need to call any byte-swapping routines. But beware: The same code ported to a little endian machine will crash. Needless to say, it's always best to call the swapping routines.

Once the server has created a socket and reserved a port on the machine for incoming client connections, the server must let the system know it is willing to receive connections by making a call to `listen`, prototyped as follows:

```
int listen (int sockfd, int backlog);
```

Here the two parameters are the socket descriptor and a `backlog` value, which specifies how many connections the system will queue while it waits for the server to execute the `accept` system call. Here's how our example calls `listen`:

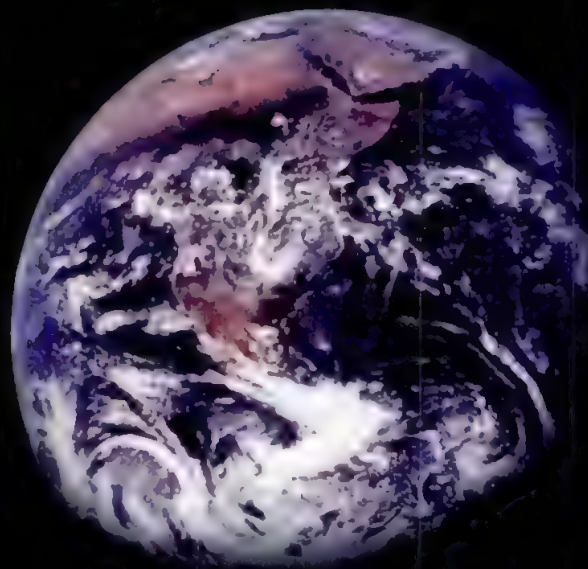
```
listen (sockfd, 5);
```

At this point the server is ready to start accepting connections. It enters an infinite loop and blocks on the system call `accept`, which has the following prototype:

```
int accept (int sockfd, struct
            sockaddr *peer, int *addrlen);
```

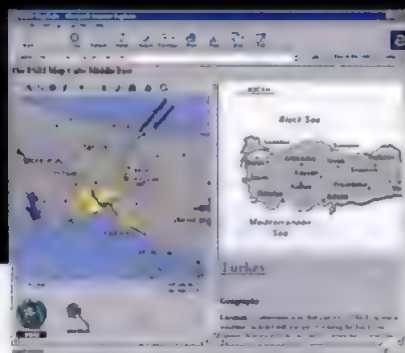
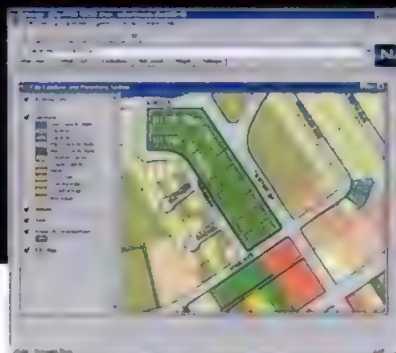
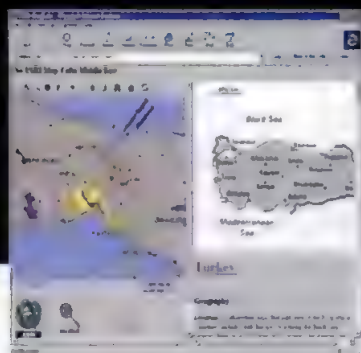
The parameters include the socket descriptor, a pointer to a `sockaddr` structure to receive the address of a connecting client, and a pointer to a value containing the size of the address structure. A call to `accept` creates a new socket descriptor, which the function returns. The

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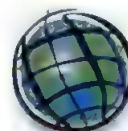
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new socket descriptor is used to communicate with the newly connected client. Here is our call to accept:

```
cliLen = sizeof(cli_addr);
```

```
newsockfd = accept (sockfd, (struct
sockaddr *)&cli_addr, &cliLen);
```

When accept returns with a valid client socket descriptor, the server creates another process for communication with its client via the Unix system call fork, which creates a clone of the process calling it and returns 0 to the child and the child's process ID to the parent. At this point, the child calls a local routine called ProcessMessages to handle the new client; the parent loops and blocks again on accept.

Within the ProcessMessages routine, the server is free to read from and write to the Windows client using the standard system calls read and write. This example blocks on a call to the utility routine readn and waits for data from the client. readn keeps calling read until the requested bytes are read. The following code snippet shows how our Unix server blocks on a read, reads a generic packet, and reads the full packet based on the size in the generic packet. A packet, as we use the term here, is a user-defined structure:

```
while (iBytesRead = readn (sockfd,
pGen,
sizeof (GENERIC)))
{
/* Swap generic packet */

pGen->usType = ntohs (pGen->usType);
pGen->usLen = ntohs (pGen->usLen);

/* Now read the full packet */

iBytesRead = readn (sockfd,
&InBuff[sizeof(GENERIC)],
pGen->usLen - sizeof(GENERIC));

... Process Packet ...
/* Write results */

rc = writen (sockfd, (char *)
&LoginAck, sizeof (LOGIN_ACK));
}
```

The communications protocol is up to you. You can define a set of command structures of fixed length or variable. If you look at the example code, you'll see a simple log-on procedure for a Windows 95 client.

THE WINDOWS 95 CLIENT

The Windows side of our sample uses a Winsock, which is implemented as a Dy-

namc Link Library (DLL). Your application must initialize an instance of this DLL for itself by calling WSASStartup:

```
int PASCAL FAR WSASStartup (WORD
wVersionRequired, LPWSADATA
lpWSADATA);
```

wVersionRequired is the highest version of Windows sockets support the caller can use (our example specifies Version 1.1). A pointer to a WSADATA structure is also passed, to receive details of the Windows sockets implementation. The example calls the WSASStartup function like this:

```
wVersion = MAKEWORD(1,1);

if (rc = WSASStartup (wVersion,
&wsaData))
return WSAGetLastError ();
```

A standard window is created for asynchronous socket notifications. This window can be visible as part of a client application or invisible perhaps for a system-level DLL. In the sample, the window is visible. After the window is created, a pointer to the worker object CWinToUnix is attached to the window with SetWindowLong:

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```
SetWindowLong (hWndAsync,
GWL_USERDATA, (LONG)this);
```

During window processing, a pointer to the worker object is retrieved using `GetWindowLong`:

```
pThis = (CWinToUnix *)GetWindowLong
(hWnd, GWL_USERDATA);
```

The Windows client initiates a connection to the Unix server by posting a user-defined message called `WM_REQUESTLOCALBYNAME` to itself after window creation. In response, the window procedure resolves the client's local name and IP address. Here is the call for posting the message:

```
BOOL brc = PostMessage (hWndAsync,
WM_REQUESTLOCALBYNAME, 0, 0);
```

The `WM_REQUESTLOCALBYNAME` message is processed by first calling `gethostname`, which returns the client's IP name:

```
int PASCAL FAR gethostname (char FAR
* name, int namelen);
```

The example calls it like this:

```
gethostname (pThis->LocalName,
sizeof (pThis->LocalName));
```

Once the local name is in hand, we can call `WSAAsyncGetHostByName`, one of the special asynchronous Windows socket calls I mentioned earlier. This Winsock call posts a user-defined message to the window procedure when the host name is resolved to a raw IP address. Here are the prototype and call:

```
HANDLE PASCAL FAR
WSAAsyncGetHostByName(HWND hWnd,
u_int wMsg, const char FAR * name,
char FAR * buf, int buflen);

pThis->hWSAAsyncGetHostByName =
WSAAsyncGetHostByName (hWnd,
WM_GETLOCALHOSTBYNAME,
pThis->LocalName,
(char *)pThis->pLocalHost,
MAXGETHOSTSTRUCT);
```

As you can see, the window handle and user message are provided for later notification. Also included are a buffer containing the local name (`pThis->LocalName`) and a buffer for retrieving local address information (`pThis->pLocalHost`). Because this is an asynchronous call, the buffers must be allocated in the heap, rather than on the stack. When the window procedure is called again with `WM_GETLOCALHOSTBYNAME`, we resolve the remote IP address

of the server in the same fashion.

After the local and remote names and IP addresses are resolved, it's time to make the actual server connection by calling `CWinToUnix::MakeServerConnection`. This method, just as in the Unix code, creates a socket and binds it to a local IP address and port. For the client, the IP address and the Windows port are wild-carded, as they are irrelevant to the client.

When the socket has been created, a call is made to the Winsock API function `WSAAsyncSelect`, in order to tell Winsock that our window wishes to be notified of a variety of socket events. The call is prototyped like this:

```
int PASCAL FAR WSAAsyncSelect
(SOCKET s, HWND hWnd,
u_int wMsg, long lEvent);
```

Here we call it to set up for a connect event:

```
WSAAsyncSelect (s, hWnd,
WM_ASYNCIONOTIFY, FD_CONNECT);
```

Once that is done, the family, remote IP address, and server port are copied to a `SOCKADDR_IN` structure and connect is called, in much the same fashion as in the Unix code:

```
ServerAddr.sin_family = AF_INET;
ServerAddr.sin_addr.S_un.S_un_b.s_b1
= pRemoteHost->h_addr[0];
ServerAddr.sin_addr.S_un.S_un_b.s_b2
= pRemoteHost->h_addr[1];
ServerAddr.sin_addr.S_un.S_un_b.s_b3
= pRemoteHost->h_addr[2];
ServerAddr.sin_addr.S_un.S_un_b.s_b4
= pRemoteHost->h_addr[3];
ServerAddr.sin_port = htons
(SERV_TCP_PORT);
```

```
connect (s, (struct sockaddr
*)&ServerAddr,
sizeof(ServerAddr));
```

When the connection has been established, the window procedure receives the `WM_ASYNCIONOTIFY` message set up by the above call to `WSAAsyncSelect`. During the processing of the message, the client requests to be notified when data is available by calling `WSAAsyncSelect`, again with the `FD_READ` option:

```
WSAAsyncSelect (pThis->s, hWnd,
WM_ASYNCIONOTIFY, FD_READ);
```

Then a user-defined log-on packet is built and sent using the method `CWinToUnix::sendn`, which ensures that all data is sent by making repeated calls to the Winsock API function `send` until the request is complete:

```
int sent = pThis->sendn (pThis->s,
(char *)&Login,
sizeof (LOGIN));
```

When data is available from the server, a `WM_ASYNCIONOTIFY` message is sent with the `FD_READ` parameter. The sample reads the available data using the Winsock call `recv`, prototyped as

```
int PASCAL FAR recv (SOCKET s, char
FAR * buf, int len, int flags);
```

ALL TOGETHER NOW

To run this sample, download the source code from PC Magazine Online. (See the sidebar "Getting the Files" in this issue's Utilities column for instructions.) You'll need a Unix shell account with compiler access for the Unix server portion. Using a file-transfer utility such as FTP, upload the Unix source files `wtouerv.c` and `wotuprot.h`. Then compile the C source file with whatever C compiler you have (usually `cc` or `gcc`). Run the new executable (normally called `a.out`). You should see output similar to the following:

```
a.out: Opened socket - socket = 3
a.out: Bind OK - port = 6555
```

Now compile the Windows code. Windows source files include `wtouwin.cpp`, `wtouwin.h`, and `wotuprot.h`. There is a project called `windowstounix` for Microsoft C++ compiler users. Other Windows 95 compilers should work fine, as we are not using the Microsoft Foundation Class Library (MFC). Once the Windows code is compiled, run the application. You'll see a tiny window called `WinToUnix`.

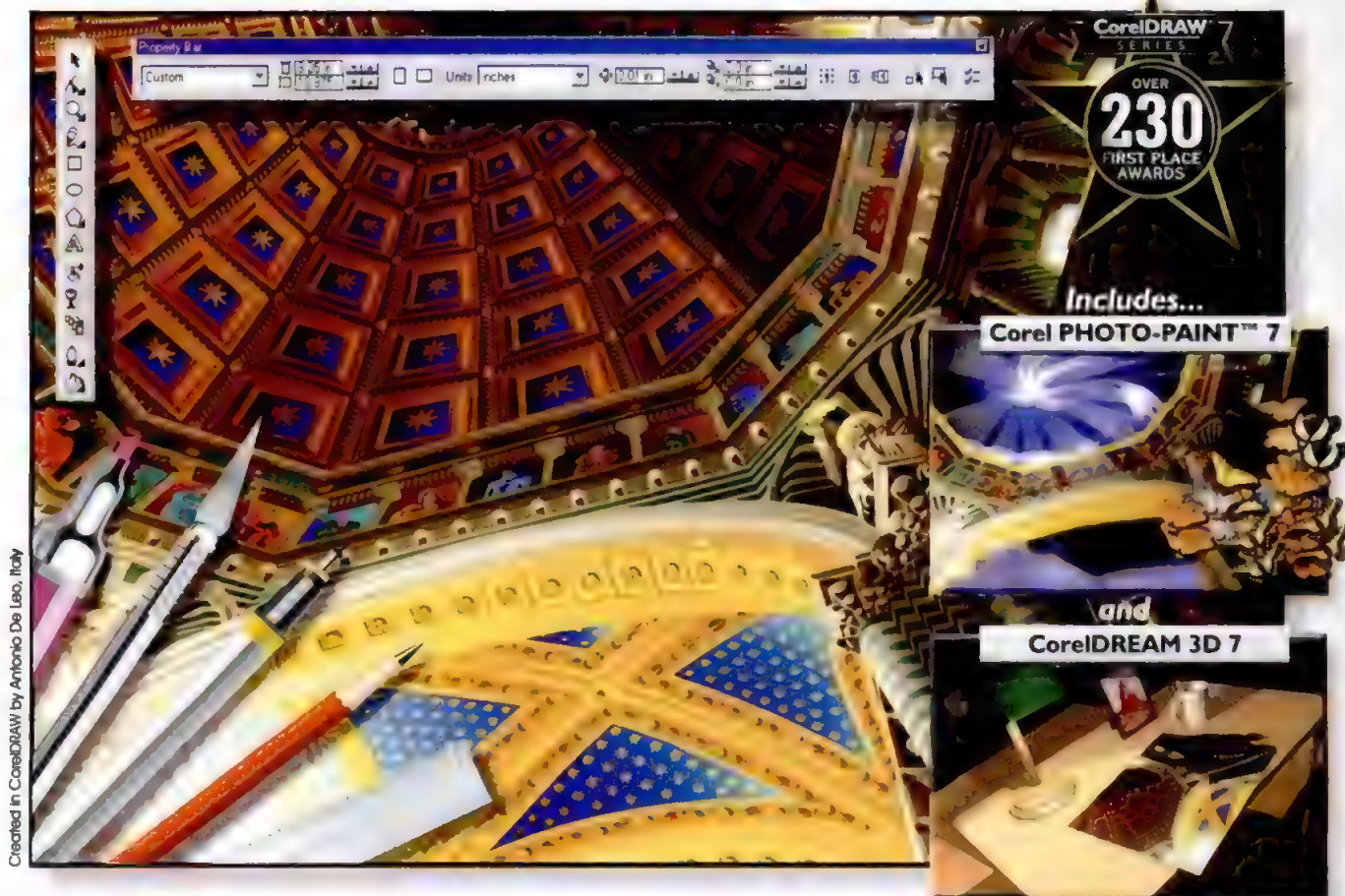
If the Unix server is running while you execute the Windows client, you'll see additional Unix output, such as the following:

```
a.out: Accepted connection - socket
= 4
a.out: Child process running! - pid
= 3444
a.out|Child: Waiting for
messages...socket = 4
Got Generic, type = 23041, reading
len = 8
CLIENT_LOGIN
```

That's about all it does. Be sure to take a look at `wotuprot.h`. You can define additional packet structures within this header for your own protocol and expand this sample framework to suit your needs. □

Zan Oliphant is a software consultant and the author of Programming Netscape Plug-ins (Sams.net Publishing; ISBN: 1575210983). You can reach him via e-mail, at zan@gate.net, or on the Web, at www.gate.net/~zan.

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By Jeff Prosis

Building Applications with Visual C++, Part 2

Our version of tic-tac-toe gets a grid and detects mouse clicks.

Last issue's Tutor was the first part of a series that shows how to develop a simple Windows application with Microsoft Visual C++. The application is a glorified version of tic-tac-toe called Tic. The game is played on a 5-by-5 grid, and the object is to line up four consecutive X's or O's horizontally, vertically, or diagonally. In this column, we'll begin fleshing out the skeleton application AppWizard generated for us in Part 1 by adding code to define the playing grid and to respond to clicks of the left mouse button.

Start your Visual C++, open the project you created last time, and follow along.

DEFINING THE PLAYING GRID

Let's begin by defining the squares that form the playing grid. MFC provides a handy class named `CRect` that we can use to represent individual squares, so we'll create a grid by adding a 5-by-5 array of `CRects` to `CTicView`. While we're at it, we'll also write a `CTicView` constructor that initializes the `CRects`. Here are the steps to follow.

In the Project Workspace window, right-click on `CTicView` and select Add Variable from the context menu. When the dialog appears, type "CRect" into the Variable Type box and "m_rect[5][5]" into the Variable Declaration box. The prefix `m_` means the variable is a member of a class; it's a convention used throughout MFC. Click the Protected radio button to protect the new member variable, and then click OK.

In the Project Workspace window, display `CTicView`'s function and data members by clicking the small plus sign next to the class name. Double-clicking on `CTicView` will take you to `CTicView`'s constructor. Delete the line that begins with "TODO" and

replace it with the code shown in Figure 1.

For the view, we'll use a coordinate system in which one unit equals 0.01 inches. The point (0,0), the point of origin, lies in the upper-left corner of the view, the positive x-axis points to the right, and the positive y-axis points up. That's why the y-values assigned to the rectangles by `CTicView`'s constructor are negative rather than positive; if we used positive y values, the rectangles would be located outside the view.

You may be wondering why `CTicView`'s constructor calls `CRect::NormalizeRect` on each rectangle. We have to do that because `PtInRect`, the `CRect` function we use to determine whether a mouse click has occurred inside a square, doesn't always work properly with negative coordinates unless the coordinates are normalized with `CRect::NormalizeRect`.

DISPLAYING THE GRID

Now that the playing grid is defined, let's add code to draw it. Windows is an *event-driven* environment, which means we can't draw into our window any time we want. Windows sends a `WM_PAINT` message to a window to ask it to repaint itself. Messages are at the heart of just about everything that happens in Windows. When a window is created, it receives a `WM_CREATE` message. When it's destroyed, it receives a `WM_DESTROY` message. MFC translates `WM_PAINT` messages into calls to the view's `OnDraw` function, a virtual function defined in `CView`. To repaint our view, we override `OnDraw` in `CTicView` and add code to do the drawing.

AppWizard has already overridden `OnDraw`, but the implementation it has provided doesn't do anything. Go to it now by displaying the list of `CTicView` functions in the Project Workspace window and double-clicking `OnDraw`. Notice that `OnDraw` has one parameter in its argument list, a CDC pointer called `pDC`.

When a Windows application writes to a screen, printer, or other output device, it does so using a *device context* (DC), which holds important information about the characteristics of the output device and the attributes of the program's output. MFC's `CDC` class represents

```
void CTicView::OnDraw(CDC* pDC)
{
    CTicDoc* pDoc = GetDocument();
    ASSERT_VALID(pDoc);

    pDC->SetMapMode (MM_LOENGLISH);

    for (int i=0; i<5; i++)
        for (int j=0; j<5; j++)
            pDC->Rectangle (m_rect[i][j]);
}
```

FIGURE 2: The `OnDraw` function draws the playing grid.

device contexts, and it includes an assortment of member functions for producing output. The `CDC::Ellipse` function, for example, draws an ellipse. The following code draws an ellipse that is 100 units wide and 50 units tall, using a `CDC` pointer called `pDC`:

```
pDC->Ellipse (0, 0, 100, 50);
```

Because the Windows Graphics Device Interface (GDI) provides a device-independent output model, the same function call works on any output device for which a Windows driver is available.

To draw our grid on screen, we'll use the `CDC::Rectangle` function. Go back to `CTicView::OnDraw` and delete the "TODO" line. Then edit `CTicView::OnDraw` so that it looks like the `OnDraw` function shown in Figure 2. The call to `CDC::SetMapMode` sets the DC's mapping mode to `MM_LOENGLISH`, in which the unit of measurement is hundredths of inches—logical inches, that is. A logical inch is based on some assumed number of pixels per inch on the output device. On printers, one logical inch equals one physical inch. On screens, a logical inch typically varies from one physical inch to about 1.5 inches. (`MM_LOENGLISH` is one of several mapping modes that Windows supports.

```
for (int i=0; i<5; i++) {
    for (int j=0; j<5; j++) {
        int x = (i * 70) + 10;
        int y = -(j * 70) - 10;
        m_rect[i][j].SetRect (x, y, x + 60, y - 60);
        m_rect[i][j].NormalizeRect ();
    }
}
```

FIGURE 1: The code to initialize `CTicView::m_rect`.

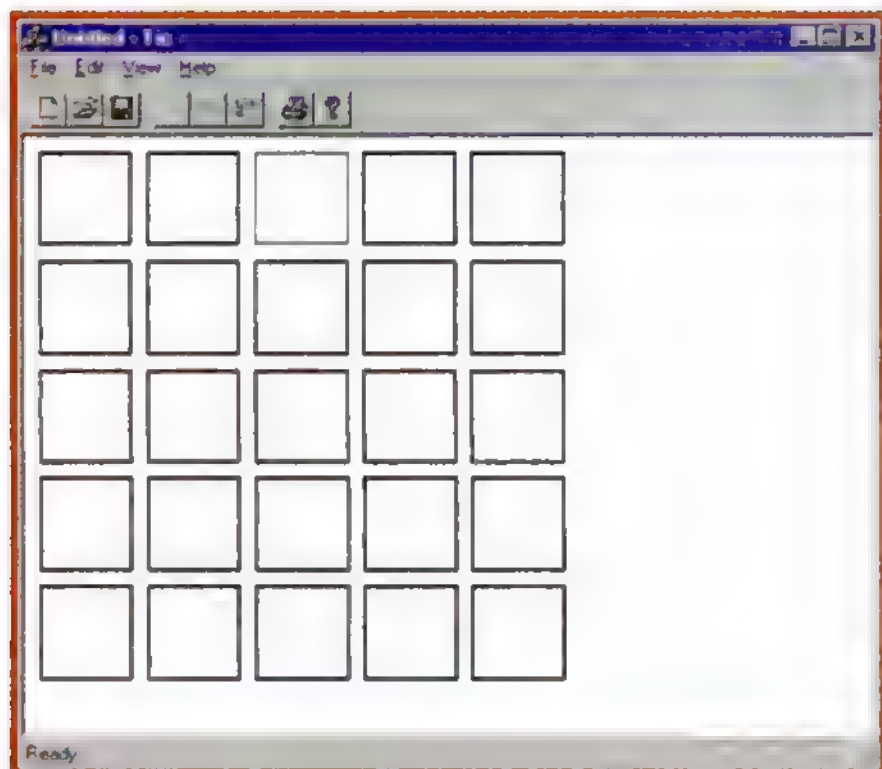


FIGURE 3: The Tic window after OnDraw code is added.

Details are in the documentation for CDC::SetMapMode.)

Once you've modified OnDraw as shown in Figure 2, rebuild the application and run it. Your grid should look like the one in Figure 3.

SENSING MOUSE CLICKS

The next logical step in our program's evolution is to add code to draw X's and O's when the user clicks on a square. But first we need to know when that happens.

Sensing mouse clicks is easy: When a user clicks the left mouse button with the mouse pointer over a window's client area, that window receives a WM_LBUTTONDOWN message. We can sense left-clicks by using Visual C++'s ClassWizard to write a WM_LBUTTONDOWN message handler for our application's view class. Use the following procedure to create the skeleton of that handler:

- In Visual C++, select View | ClassWizard (or press Ctrl-W) to invoke ClassWizard.
- Click the Message Maps tab.
- In the Class Name box, select CTicView.
- In the Object IDs box, select CTicView.
- In the Messages box, select WM_LBUTTONDOWN.
- Click ClassWizard's Add Function button.

When you click Add Function, ClassWizard adds a member function named OnLButtonDown to Tic's view class. It also adds an entry to the view's message map (a table that correlates messages to message handlers) that ensures OnLButtonDown will be called whenever the view receives a WM_LBUTTONDOWN message. You can see CView's message map by scrolling to the top of TicView.cpp; look for the code that begins with BEGIN_MESSAGE_MAP and ends with END_MESSAGE_MAP.

Why did we make OnLButtonDown a member of the view class? Remember that messages reporting mouse clicks go to the window under the cursor. When a user clicks a square in the playing grid, the WM_LBUTTONDOWN

message goes to our view, so if the message handler were attached to any other class, it wouldn't be called.

ClassWizard creates the OnLButtonDown function for us, but the function doesn't do anything. It's up to us to add code to tell it what to do—for example, to draw an X or an O. Before doing any drawing, however, OnLButtonDown must test whether the click occurred inside one of the playing grid's squares. We'll close out Part 2 of this series by adding hit-testing code to CTicView::OnLButtonDown. For the moment, we'll have it pop up a message box when a click occurs inside a square.

In the ClassWizard window, select OnLButtonDown in the list of CTicView member functions displayed in the Member Functions box. Click the Edit Code button to go to the source code for CTicView::OnLButtonDown. Then modify the function as shown in Figure 4 and rebuild the application. Now, when you click on a square, the message "You clicked it!" should appear on your screen.

The message box is displayed by the following statement:

```
MessageBox ("You clicked it!");
```

which invokes MFC's handy CWnd::MessageBox function. (CView, the base class for CTicView, is a descendant of CWnd, so it's perfectly legal for CTicView member functions to call CWnd member functions.) CRect::PtInRect is called once for each square until all the squares have been tested or PtInRect returns a nonzero value indicating that the click point lies inside a CRect. The CPoint parameter passed to OnLButtonDown contains the x- and y-coordinates of the click point. CPoint is the MFC class that represents points in two-dimensional space. A CPoint with x and y data members equal to 10 and 20 means the click occurred 10 pixels to the right of and 20 pixels below the upper-left corner of the view window. Because our grid coordinates are stored in MM_LOENGLISH units,

we must convert the CPoint to MM_LOENGLISH units before doing any hit-testing. The statements

```
CClientDC dc (this);
dc.SetMapMode (MM_LOENGLISH);
dc.DPtoLP (&point);
```

perform the conversion by getting a DC for the view's client area, setting the DC's mapping mode to MM_LOENGLISH, and calling CDC::DPtoLP. After the conversion, a nonzero return value from PtInRect means the point lies inside a square. When that happens, i and j hold the square's array indexes. If the coordinates passed in the CPoint don't lie inside any of the squares, the nested for loop ends and the code that displays the message box is never executed.

COMING UP

We've now defined the playing grid and added code to detect mouse clicks inside a square. The next step is to draw an X or an O. First, however, we need to establish a means for the view to determine whether a clicked square already contains an X or O, in which case we'll ignore the mouse click, and whose turn it is, so we'll know what to draw in an empty square.

In Part 3 of this series, we'll modify our application's document class to store X's and O's and also to keep a record of whose turn it is. Once that's done, we'll add member functions to the document class to pass that in-

```
void CTicView::OnLButtonDown(UINT nFlags, CPoint point)
{
    CClientDC dc (this);
    dc.SetMapMode (MM_LOENGLISH);
    dc.DPtoLP (&point);

    BOOL bQuit = FALSE;
    for (int i=0; i<5 && !bQuit; i++) {
        for (int j=0; j<5 && !bQuit; j++) {
            if (m_rect[i][j].PtInRect (point)) {
                MessageBox ("You clicked it!");
                bQuit = TRUE;
            }
        }
    }

    CView::OnLButtonDown(nFlags, point);
}
```

FIGURE 4: The edited OnLButtonDown function.

formation back to the view. Then we can finally get down to the business of drawing X's and O's. □

Jeff Prosise is a contributing editor of PC Magazine and the author of Programming Windows with MFC, published by Microsoft Press.



PC Tech/Operating Systems

By Brian Proffit

Talk Back to Your Computer

Speech recognition in OS/2 Warp 4.0.

In the 1960s, "Star Trek" brought to the public a concept that had originated in earlier science fiction: talking directly to a computer and having it understand and respond to your words. That seemed so much more natural than punching 80-column cards—but it also seemed to be something that would be achieved only in the future, when we would have starships capable of traveling faster than light.

Because of the sheer variety in the way people speak—low-pitched men's voices, higher-pitched women's voices, regional accents, all the way down to the changes in one's own voice during allergy season—speech recognition has proved to be a difficult technology to master. It's already in use in some devices, such as car phones. But in such cases, the vocabulary that the hardware has to be able to distinguish is quite limited; the numbers 0 to 10, words like *dial* and *hang up*, and perhaps a few names, which users record in their own voices. In fact, voice commands have been used in computer systems, too, but have typically been limited to a few desktop commands, such as *open* and *close*. For that to work, computers required special hardware tailored for speech recognition. And that's why the speech support built into OS/2 Warp 4.0 is a significant leap forward.

NO ADAPTER REQUIRED

Although based on IBM's VoiceType technology, OS/2's speech recognition doesn't require any special hardware. Even if you have the VoiceType Adapter used by earlier versions of OS/2, the current version doesn't exploit it. Any OS/2-supported sound card will work, thanks largely to the new Direct Audio Routines (DART) interface. (For a discussion of this interface, see "Fast as a Dart: OS/2's Direct Audio Routines," *PC Magazine*, January 21, 1997.) The interface's significant performance improvements in audio processing allow your general-purpose computer to handle the job.

Speech recognition does, however, take a fairly high-powered computer. I would con-

sider a Pentium/100 system with 24MB of RAM the minimum for acceptable performance. And you'll achieve a higher accuracy rate if you use a microphone with active noise cancellation (ANC). That's why IBM includes an ANC headset in the box with OS/2.

GETTING STARTED

The first step is setting up an individual user profile. You don't have to train OS/2 to your voice (though we'll discuss shortly the reasons you might want to), but you do need to identify yourself. That way, if you make corrections to VoiceManager's interpretation of your words, it can learn from your corrections automatically and begin tailoring itself to your speech patterns. Click on Programs | VoiceType | VoiceManager to load the speech recognition routines. The first time you do, OS/2 will bring up the User Profile dialog, allowing you

commands. Both of these windows can be reconfigured to take up less desktop real estate. One nice feature of the VoiceManager window is a level indicator that shows how loudly your voice is being received. That will help you learn how far from your mouth you should adjust the microphone.

DESKTOP NAVIGATION

With no training, OS/2 does a reasonable job (better than 90-percent accuracy, according to my tests) of recognizing desktop navigation commands. And desktop navigation is done with normal speech, rather than the distinctly *<pause>* separate *<pause>* words required for most speech recognition. This allows for more extensive desktop functions than you might expect. OS/2 successfully recognizes spoken commands, such as *MoveBottomBorderDown4*, and resizes a window. In a window with a horizontal scroll bar, you can use the commands *PageUp* and *PageDown* to move one page at a time. If you say *ScrollDown*, the window begins scrolling down, as if the mouse button were being held over the down arrow. When you see what you're searching for, say *Stop*, and the scrolling ends.

But speech is integrated even more deeply into OS/2. No matter what is visible on the screen, you can say the command *JumpToWebEx* to open the WebExplorer. There are predefined *JumpTo* commands for 20 key OS/2 components. You can also define your own commands for opening objects. You could define the voice command *HiBoss* to open your word processing program—covering the Solitaire game on your desktop without using your hands. You can move the focus among open windows just as easily with commands like *SwitchToSystemEditor*.

Programs don't have to be written for speech to take advantage of these functions. OS/2 detects, for example, the entries in a program's menu bar and makes each of those words speech-selectable. More speech-sensitive applications should be available soon, though, because IBM included the Speech Recogni-

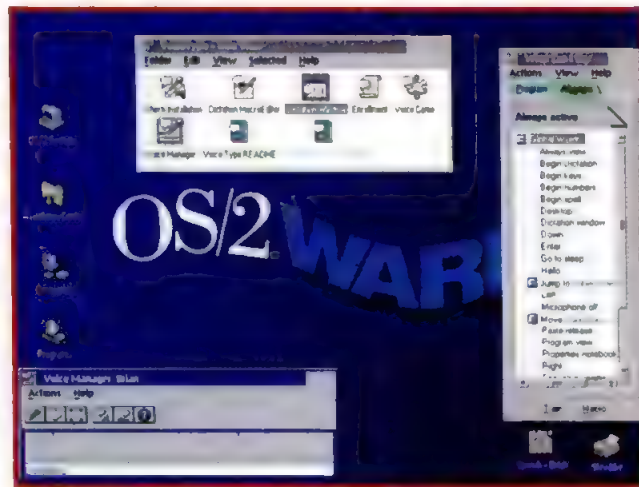


FIGURE 1: The VoiceManager and What Can I Say windows control speech and let you see which voice commands are currently available.

to enter your name. An icon will then be added to the desktop with your name on it. Opening that object will load VoiceManager with your profile (see Figure 1).

The optional What Can I Say window gives a list of voice commands understood by the program that has the focus, along with general commands that are always available. Notice the blue border in the VoiceManager window. That's OS/2's way of letting you know which part of your desktop has the focus for voice

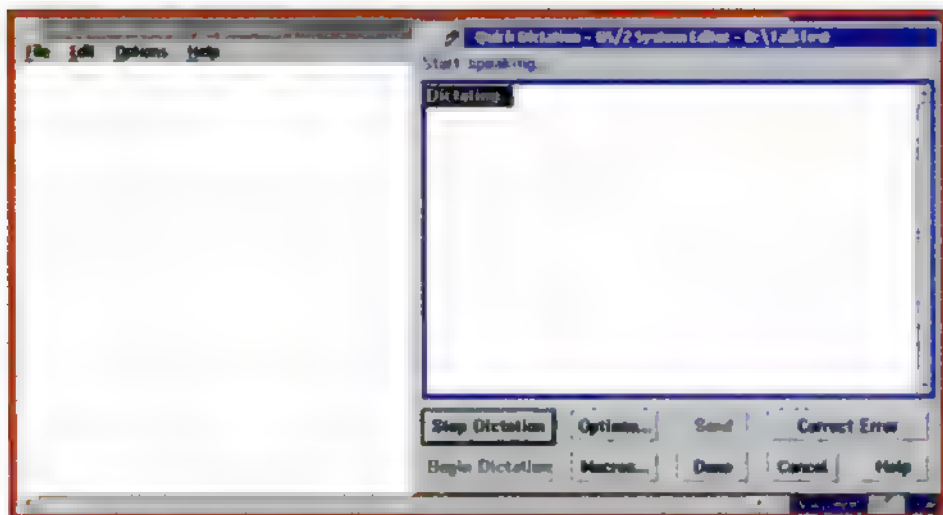


FIGURE 2: You can pop up a dictation window to speak text into any field that can take text from the clipboard.

tion interface in the OS/2 Warp 4.0 Toolkit. The new Web Explorer provides a good illustration of what can be done. For example, as you load Web pages, WebEx detects the hot links that are visible on the page. Each of those is then speech-accessible, allowing hands-free surfing.

TEXT-DICTATION FUNDAMENTALS

Moving from desktop navigation to full text dictation is only slightly more complex, at least for the user. For the computer, the workload goes up dramatically. In order to handle text dictation, VoiceType has to be aware of the words you are likely to use—and be able to recognize these promptly. A vocabulary of 10,000 words is included with OS/2, and you can add up to 32,000 words of your own. There are specialized add-on vocabularies available for the medical and legal professions, which have jargon all their own. For OS/2 to be able to recognize your use of these words promptly, though, most of that vocabulary needs to be in memory. That's why 16MB of RAM is sufficient for desktop navigation's limited vocabulary, but 24MB is a minimum for reasonable response in dictation.

A lot of computing is required, too, to break down the sound into its component parts and match those with the vocabulary. But dictation has even greater requirements. VoiceType has to handle homophones: words that are different but sound alike. So when you're dictating, VoiceType analyzes the grammatical patterns in your sentences so that it can make an educated guess as to whether the word you just said should be spelled *to*, *two*, or *too*. That's why a slower Pentium or even a high-end 486 may be able to handle desktop navigation, but a Pentium/100 is a more realistic minimum for dictation.

Even with all its power, VoiceType still can't decode normal speech patterns for dictation. Unlike navigation, dictation requires that you pause briefly between each word. The result sounds a bit awkward at first, and the software may seem slow. But even with the pauses, it is still far faster than most people can type. It does take some practice, though, to become proficient at speaking in

the required style. That's why I strongly suggest you take the time to enroll with VoiceType.

Enrollment consists of reading a series of words, phrases, and sentences as they are displayed on the screen, allowing VoiceType to become accustomed to your speech patterns and greatly increasing its accuracy in transcription. But it also lets you gain experience at speaking in discrete words. You can see when VoiceType does or doesn't recognize your

words, and you can play back what you've said to hear the distinctions between what works and what doesn't. The few minutes spent in enrollment can save a lot of frustration down the road.

GETTING SPEECH INTO YOUR APPLICATIONS

You can dictate into any application (or any field in any application) that accepts text from the clipboard. So whether you're using your favorite word processor or the OS/2 System Editor, speaking the command *BeginDictation* pops up the Quick Dictation window (Figure 2). As you speak, your words will appear in the window. If you see recognition errors, don't worry about them yet. Just keep on dictating.

When you're finished, the command *StopDictation* takes VoiceType out of dictation mode. Now, using voice commands or the mouse, mark the first word that was recognized incorrectly. A dialog like the one in Figure 3 will pop up. VoiceType offers alter-

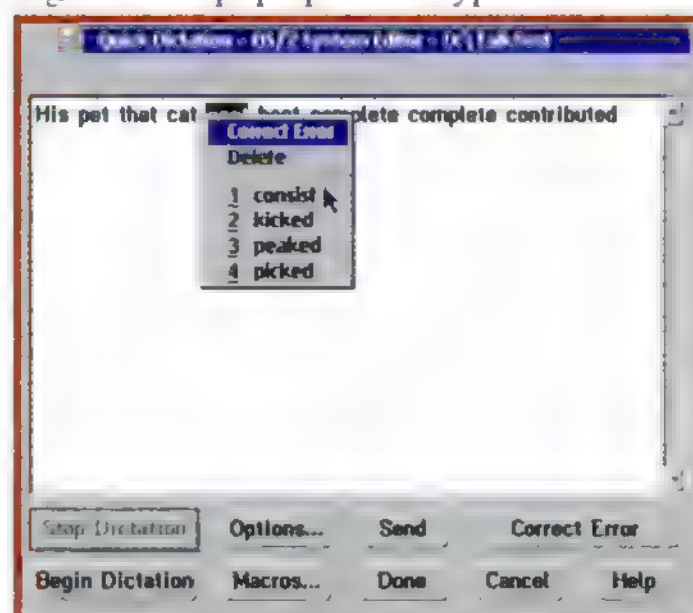


FIGURE 3: VoiceType makes corrections easy, and learns from them.

native words for you to select from, or you can select *Correct Error* and type in the correct word.

VoiceType learns from your corrections, storing the sound you spoke and the word you selected or typed, so it will be more likely to recognize the word correctly in the future. If you're doing numeric input or using acronyms, you can put the dictation window into a different mode. The command *BeginSpell*

allows you to enter individual letters through their sound (*ay*, *bee*, *cee*) or their standardized word equivalents (*alpha*, *bravo*, *charlie*). The command *BeginNumbers* interprets your dictation as 1, 2, 3, rather than *one*, *two*, *three*.

When the text appears the way you want it, just say *Send*. The text is copied to the clipboard and then automatically pasted into your application. If all you're trying to do is get text into a file, you don't even need an application. There's a VoiceType Dictation Window that has more functions than the Quick Dictation window. The Dictation Window is effectively a text editor designed for speech input. It lets you save your dictated text directly to a file, and it supports all standard cut, copy, and paste operations.

VOCAL SHORTCUTS

Unless you're the quickest of typists, dictation will be a faster way of getting text into your computer—particularly after you've worked with VoiceType for a couple of weeks so that it's had an opportunity to learn from your corrections and adapt to your voice. Just as keyboard macros can save you typing time, voice macros can make the dictating process even faster.

Several macros are included with VoiceType. You dictate punctuation through macros, such as *ExclamationPoint*, that are translated into the appropriate characters. But you can define your own macros, too. There is a difference between navigation macros and dictation macros. *ExclamationPoint* is an example of a dictation macro; it has no meaning in desktop navigation mode. When creating dictation macros, you need to be careful what command you use. Setting up a macro for the word *Sign* to type in "Sincerely, Brian Proffit" doesn't make sense if you're a sign company and need that word to appear normally in your letters! On the other hand, assigning the macro to the sound *BeePee* may work fine.

THE FUTURE

Since IBM has built speech recognition into the base OS/2 Warp 4.0 product (and a headset microphone is included with the product), software developers can assume that their audience has speech support in their systems. This dramatically increases the potential audience for applications written to exploit speech usage. To further encourage development, IBM included the Speech Recognition Application Program Interfaces (SRAPIs) in the OS/2 Warp 4.0 Toolkit. As a result, it seems likely that OS/2 Warp 4.0 will trigger a number of new speech applications, along with enhancements to existing applications. And that could help make computer users out of the most adamant technophobes. □

Brian Proffit is a frequent contributor to PC Magazine.



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PC Tech/Internet Tools

By Linden deCarmo

Internet Telephone Standards

It's time to end the confusion of Internet phone software.

It's every teenager's dream come true—unlimited long-distance telephone calls to anyone, anywhere in the world, for just the price of a local call. In fact, cheap long distance has been one of the main selling points for Internet telephones. But there's one thing you don't usually hear in the marketing hype: Both parties must use the same software, or the call can't be made. That's because each vendor uses a proprietary protocol to transmit conversations. In this article, we'll take a look at the reasons for incompatibility among current phones, the various technologies that make up a software telephone, and some proposed Internet telephony standards. You'll need a basic understanding of Internet protocols; for a starting point, see the Tutor column of November 19, 1996.

The Internet telephony market is splintered. Since there were no standard guidelines from the start, each vendor has been free to design its Internet phone in any manner it saw fit. While this chaotic environment has not been good for users, it actually has promoted innovation, since companies have been able to incorporate sophisticated audio compression routines, security protocols, and directory services, in order to differentiate their software from their competitors'.

When it became apparent a year or two ago that Internet phones had the potential to revolutionize the communications industry, standards groups—including the International Telecommunications Union (ITU) and the Internet Engineering Taskforce (IETF)—began to discuss the implementation of Internet phones, compatibility issues, and security concerns.

You may be wondering why two different groups appear to be addressing the same problems. But in reality, each is working on different aspects of software telephony. ITU has focused on defining how telephone software should operate over LANs and other networks, while IETF has concentrated primarily on multimedia protocols over networks, such as the Internet.

Because working groups are composed of companies and educational institutions with differing priorities and interests, they often proceed at a glacial pace and produce numerous document drafts before approving a final

standard. Only within the last year have stable specifications for Internet telephony been released, so vendors can write products that conform to them. Intel has released a product, the Intel Internet Phone, that implements the ITU recommendation, and Microsoft and Netscape have announced that they are planning products that conform to the ITU standard. Many smaller companies no doubt will follow the heavyweights' lead.

THE H.323 DRAFT STANDARD

Since the industry has been promoting the ITU standards and IETF drafts as cures for compatibility problems, we're going to delve into the details of how and why they work. The most important of the new standards is the ITU H.323 draft. In fact, H.323 has become the bible of Internet telephone software writers. Not only does it define the basic capabilities Internet telephone software must support, it also dictates that a net phone conform to additional recommendations for call control, audio, and video compression technologies, respectively.

Since H.323 is closely associated with Internet telephony, many people incorrectly assume it covers audio-only software telephones. In reality, H.323 not only addresses audio but also defines how video telephones should work. It also lets applications perform conferencing (by shared whiteboards, for example) and other

forms of data exchange. Even more intriguing is the fact that an H.323-compliant phone does not have to run on a personal computer. Any device that can communicate using the protocols can claim H.323 compliance. In fact, it's possible that in the future, conventional telephones, fax machines, and even video-game systems will be H.323-compatible.

The reason for the growing popularity of H.323 is that it doesn't try to cover every aspect of telephony. The standard focuses primarily on the data streams (or signals) that a phone can use. All compliant telephone software should support audio and communication control signals. Audio signals contain compressed digital audio data, usually speech, while communication signals allow a phone to determine the features of a phone it's calling and to monitor the progress of a call. The standard also gives phone software the option of using video signals (compressed motion video information) and data signals (bitmaps or binary files).

Since all phone software facilitates conversations, programs must be able to exchange audio data. So one of the first things H.323 defines is the compression/decompression (or *codec*) algorithms a phone may deploy. For instance, H.323 permits sending audio data compressed with μ -law or A-law (G.711), or with MPEG 1 Audio or TrueSpeech II (G.723). All compliant phones must at least support μ -law and A-law. More advanced codecs (such as TrueSpeech II) may be used, but only if both phones support the codec.

Although the standard defines the audio compression technologies a phone can use, it does not address machine-specific features such as minimum microphone quality or the number of simultaneous conversations allowed. By ignoring those issues, H.323 avoids the pitfalls of being tied to a particular platform or operating system.

In the past, videophones have had limited market penetration, the result of high cost, low picture quality, and cautious user attitudes. At some point in the future, the videophone concept will

The H.323 Standard

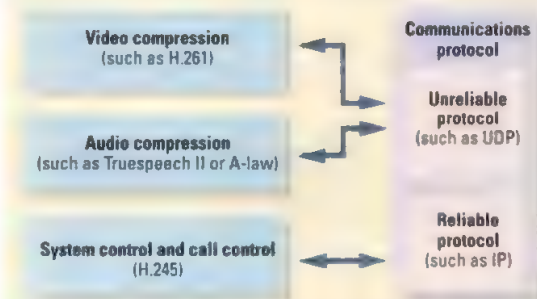


FIGURE 1: H.323 covers topics such as audio and video compression and call control. It does not address machine or lower-level protocol issues, such as which LAN transport mechanism to use.

be accepted, and H.323 will be ready for it. In fact, H.323 already allows you to see video transmitted using the H.261 and H.263 standards. Since video support is optional in H.323, it is still possible to write a compliant phone without motion video support.

Both audio and video data streams defined in H.323 may be transmitted via *unreliable protocols* (such as UDP). Unreliable protocols don't guarantee that data will reach its destination error-free or in the order in which it was sent. Since they don't have to guarantee delivery, these protocols are smaller and faster than *reliable protocols*, which guarantee error-free data delivery. (If you are concerned about how useful an unreliable protocol is, one net phone vendor reports that more than 99 percent of all data packets sent via UDP arrive intact at their destinations). The reduced overhead allows more processing power to be used on the audio and video codecs.

THE CONTROL FUNCTIONS: H.245

It's the audio and video capabilities of an Internet phone that attract users, but the control functions defined in the H.245 standard are what actually allow the phone to work. H.245 defines how a phone should connect to another phone, start a conversation, determine the capabilities of the receiving phone, and hang up a call. Unlike audio and video signals, H.245 control signals must be transmitted via a reliable protocol, such as TCP/IP, since the loss of even one message could result in a failed call.

One of the primary duties of H.245 is to determine which phone will become the master of the relationship and which the slave. These politically incorrect titles are required, since certain commands, such as a request for a single, nonshareable resource, can be transmitted only once by the master. If both parties to the conversation try to transmit the message, the call will fail. So once the phones pick the master, their relationship will remain unchanged for the duration of the conversation.

The master/slave agreement is followed by an exchange of capability messages, which the programs will use to determine the best techniques to facilitate the phone conversation. This step must be performed immediately, since H.245 decrees that a sending device will never transmit a message that isn't supported by the receiving device. For example, the terminals may ask each other what audio compression routines are available and whether or not the phone supports full-duplex (simultaneous sending and receiving) or half-duplex (only one direction at a time) transmission. Applications may also use H.245 to determine what resolution is recommended for bitmaps and even whether the receiving phone can receive faxes.

Besides establishing device capabilities, H.245 offers encryption options and flow-control functions that determine, for example,

the channel number for data transmission or the maximum bit rate. Another important feature available in H.245 is the ability to monitor *jitter*, the variation in delivery time for data packets. Excessive jitter can be devastating to a phone conversation: Long delays in receiving audio data packets result in choppy audio.

CONFERENCING OPTIONS: T.120

If users want to add visual and data enhancements to their phone conversations, H.323-compliant phones can offer those features. The ITU's T.120 standard was designed to facilitate audiovisual conversations for two or more people. It lets a net phone determine the conferencing capabilities of the other phone

It's the audio and video capabilities of an Internet phone that attract users, but the control functions defined in H.245 are what actually allow the phone to work.

or phones, transfer files and images, enable a shared whiteboard, and establish and manage conferences.

Like H.245, T.120 must be transmitted using a reliable transport protocol. In order to start a conference, T.120 uses a technique called General Conference Control (GCC), which allows an application to create, control, and terminate a conference. T.120 programs also use the General Application Template (GAT) to ensure that every compliant application uses the right protocols. By using GAT and GCC, applications can participate in multiple simultaneous conferences.

Two of the more hyped features of T.120 are the *still image* and the *shared whiteboard*. The still-image feature enables programs to transfer bitmaps and graphics irrespective of machine type or operating system. The shared whiteboard allows conference participants to annotate images, perform numerous bitmap manipulations, and transfer binary files. T.120 applications can also support remote keyboard and mouse control, so that conference participants can show other members the changes they would like to see in shared documents.

IMPROVING INTERNET MULTIMEDIA

While the ITU has primarily contributed to the Internet telephony derby by defining how a telephone application should operate, the

IETF has focused on improving the Internet for multimedia users in general. TCP/IP was designed for reliable communication, and as a result, if you send another computer a packet over the Internet, you can be assured it will arrive at its target error-free. But there never was any guarantee that the data would arrive in a timely manner. In fact, it's theoretically possible for a packet to be delayed several hours—or even days—before it reaches its destination.

In contrast, multimedia applications, and telephone software in particular, are usually not as concerned about reliability as they are about predictability. If the data rate is not predictable, users will experience audio breakup during phone conversations. Since the Internet has no predictability guarantee, many of the current generation of phones suffer from occasional, sometimes severe audio gaps. This limitation will continue to be increasingly problematic as growing hordes of new users bog down the Internet.

RSVP FOR QOS

The first option recommended by the IETF is the Resource Reservation Protocol (RSVP). Multimedia applications can use RSVP to request a specific quality of service (QOS) over an existing network protocol—primarily IP, although it is possible to use UDP—to ensure smooth video and pleasing audio. RSVP implements QOS by guaranteeing that a specific amount of data can be transported through each computer, or node, connecting both ends of the phone conversation.

One interesting feature of RSVP is that resource reservation requests are sent only from data receivers to data senders and not vice versa. One reason for that approach is that only the receiving device knows the data rate at which it must receive in order to decode video or audio reliably. Another unique feature of RSVP is that reservations are good for only one direction. In addition, RSVP does not support the mixing of audio and video on a reserved channel.

When RSVP applications are finished communicating, they should use the *tear-down* feature provided by the protocol. Tear-down deletes all resource reservation requests by a program and allows other applications to use the Internet bandwidth. If the program is sloppy and fails to tear down the RSVP reservation, the protocol will notice the lack of data transfer, using a time-out, and automatically tear down the reservations.

Since RSVP accomplishes QOS by reserving resources, or bandwidth, on the network, careless or devious users can hog network resources by starting multiple QOS sessions. Once a reservation is made, other users cannot use its bandwidth even if the person who reserved the space isn't transmitting. Unfortunately, RSVP does not have a defined mech-

Internet Tools

anism to prevent that problem from arising, suggesting only that administrators devise their own policies. Clearly, a more aggressive solution is required if RSVP is to be successful.

Another potential pitfall for RSVP is getting the intense, highly competitive Internet service provider (ISP) industry to support it. Most users pay an ISP to access the Internet. And even if both ends of the telephone conversation use the same ISP, still other ISPs are involved in transmitting the conversation, because of the way the Internet is organized. As a result, RSVP has the potential of allowing users from ISP A to reserve, or lock, resources on ISP B's network without remuneration, potentially affecting ISP B's ability to serve its paying customers.

RTP FOR SYNCHRONIZATION

Although RSVP addresses QoS issues, it does not fix the fundamental weakness inherent in Internet protocols for multimedia applications—poor synchronization support. Reliable protocols, such as TCP/IP, have many layers to ensure that data is not lost. Those layers, however, can cripple time-sensitive audio and video decompression routines, which suffer when data is not delivered in a timely manner. In addition, there is no notion of time associated with IP, so synchronization can be extremely challenging. As a result, the IETF has designed

the Real-time Transport Protocol (RTP).

Typically, RTP is run on top of an unreliable protocol, such as UDP. Each data packet sent via RTP has timing information and a sequence number attached to it. That information enables applications to mix audio and video streams relatively easily. The timing information associated with each packet also allows smooth synchronization, since applications can easily determine the correct packet number to jump to if video frames need to be skipped. Another benefit of RTP is that it may be combined with RSVP to transmit synchronized multimedia content with a specific quality-of-service level.

Multimedia applications can enhance RTP further by combining it with another IETF protocol, the Real-time Transport Control Protocol (RTCP). With RTCP, programs can adjust to changing network loads by notifying senders and receivers of *spikes*, or variations, in network transmissions. For instance, RTP-enabled phones can monitor the capacity available on a network and switch instantly to a lower-quality audio codec when there are too many users.

One concern of many portable phone users is the ability of nosy neighbors to listen to their conversations. Since the Internet is brimming with hackers—not to mention some unsavory characters—those concerns are mag-

nified when you use a software phone.

Under normal circumstances, conversations are transmitted over the Internet without being scrambled. As a result, any node in the data path can tap in and listen to your conversation. To address such concerns, RTP offers some limited security and confidentiality. But those features are not the most robust in the industry, and in reality they appear to be a stopgap, until the protocols underlying RTP support advanced security features.

SUMMING UP

The Internet telephone market is splintered into a multitude of independent vendors whose products are incompatible. Fortunately, the IETF and ITU are creating standards and document drafts that will enable a future generation of phones to interoperate.

While the IETF and ITU standards are not on the cutting edge of technology, they do define the basics of how a phone should operate and how telephony should travel over the Internet. When the standards are adopted, Internet telephony may even approach the reliability and quality of conventional phones. □

Linden deCarmo is a senior software engineer at Oak Technology, where he works on multimedia products. Previously he was a lead developer on the OS/2 audio team at IBM.

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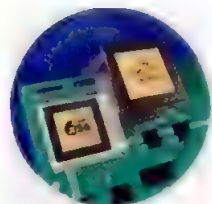
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PC Tech/Utilities

By John Durbrouck

Easy Access to Desktop Icons

TrayLaunch lets you launch desktop programs from Windows 95's tray.

Windows 95 offers some significant user interface improvements over Windows 3.1. In the latter, you must hunt through group windows to find the program you want. Windows 95 makes programs accessible in two alternative ways: through the Start menu on the Taskbar, and through shortcuts placed on the desktop. Most programs can be accessed through the Start menu, but certain system utilities are only available on the desktop—for example, My Computer or the Recycle Bin. This can be inconvenient if you have a lot of windows open.

A partial solution is to put a folder with your desktop shortcuts in your Start menu (for more information, please see the User-to-User column, *PC Magazine*, October 8, 1996), but this approach has some limitations. You can't get menu access to the folder's contents, and you have to open folders as Windows 3.1-style program groups and then manually close them. Also, the folder contains shortcuts only to application programs, not to system utilities. The only way to get to the desktop system utilities is to stop what you're doing and minimize your open windows—that is, unless you have TrayLaunch, this issue's utility. TrayLaunch, which resides in the tray on the far end of the Taskbar, gives you menu access to *all* the programs on your desktop, including system utilities.

You can obtain TrayLaunch by downloading it from PC Magazine Online or by mail. (Refer to the sidebar "Getting the Files" at the end of this column for details.) The source code for TrayLaunch, which was written in Microsoft Visual C++, is also provided, for those interested in seeing how it works.

USING TRAYLAUNCH

TrayLaunch is easy to install and to uninstall. Copy the program file Traylnch.exe to your hard disk and create an icon for it in your shell. To start TrayLaunch, double-click its icon, or place it in your StartUp group so it runs each time you start Windows 95. To remove TrayLaunch from your system, simply delete the program file and remove any shortcuts to it that you created. TrayLaunch writes to no other files and makes no entries in the system Registry.

IN THIS ISSUE

TrayLaunch

TrayLaunch lets you access all the icons on your desktop from the Taskbar, including system utilities like My Computer and Recycle Bin that are placed on the desktop by Windows. These system utilities are normally accessible only from their desktop icons.



When you first launch TrayLaunch, the only thing you will see is a new icon in your system tray. That's the area on the right-hand side of the Taskbar, where the Windows clock resides. Figure 1 shows the TrayLaunch icon—a green light—in the system tray.

To access the icons on your desktop, right-click on the TrayLaunch icon. This will open a pop-up menu with three sections (see Figure 2). The topmost section consists

of the items that Windows creates on your desktop, such as My Computer and Recycle Bin—the items you can't usually access from the Taskbar. They are separated from your own files and shortcuts to make them easier to find, and they are sorted alphabetically. The second section, which contains any items you placed on the desktop yourself, is also sorted alphabetically. The third section of the menu contains two items: About TrayLaunch and Exit. Select Exit to terminate TrayLaunch and remove it from your system tray. You can, of course, restart it at any time.

If you double-click the My Computer icon on the desktop, a single-paned Explorer window appears. Right-clicking the icon yields the menu shown in Figure 3. Similarly, double-clicking the My Computer item in the TrayLaunch menu will carry out the My Computer default action, opening a single-paned Explorer window. Double-clicking on any TrayLaunch menu item will perform its default action (the one in boldface in its context menu). You can also choose any of the other context-menu items (such as Explore and Find, for My Computer), or bring up the Properties sheet.

Most TrayLaunch menu options operate just like their corresponding desktop icons, but there are a few differences. You may notice that a couple of items that appear in the context menu of the My Computer desktop icon (Figure 3) are missing from the TrayLaunch version (Figure 2). For example, items such as Create Shortcut and Rename, which relate specifically to the icon version of the item, are not included in the TrayLaunch menu.

Once the TrayLaunch menu is displayed, you can explore it as long as you like. These

FOR PROGRAMMERS ONLY TrayLaunch is an OLE application written with Microsoft Visual C++ 4.1 and MFC (Microsoft Foundation Classes). The full source code, which is available on PC Magazine's Web site (www.pcmag.com), demonstrates these programming techniques:

- How to remove the document/view code from an AppWizard-generated SDI application;
- How to design an efficient tool for creating and servicing an icon in the Windows 95 system tray; and
- How to use COM interfaces to browse the Windows 95 shell's namespace and

retrieve desktop items.

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are standard Windows menus, so clicking anywhere outside the menus' confines will dismiss them.

PROGRAMMING TRAYLAUNCH

I ran into several challenges writing TrayLaunch, which is an OLE application written with Microsoft Visual C++ 4.1 and MFC (Microsoft Foundation Classes). I needed a frame window but had no use for document/view architecture. TrayLaunch demonstrates an easy way to strip down an AppWizard-generated SDI (Single Document Interface) application. I also had to create and service an icon in the system tray; TrayLaunch includes a tool that makes that simple. Finally, TrayLaunch uses some simple COM interfaces to browse the shell's namespace and retrieve desktop items. I'll describe the stumbling blocks I encountered in creating these interfaces and how to get around them.

STRIPPING OUT DOCUMENT/VIEW

Writing Windows programs used to be a lot more difficult before today's visual environments. But sometimes a tool as useful as AppWizard, which generates the framework for an MFC application, can do just a bit too much. For TrayLaunch I needed a window that could receive messages, as I'll explain below, so I couldn't use a dialog-based application. The simplest practical choice was SDI, which unfortunately carries along with it the document/view architecture.

This isn't a lot of additional code, but a document/view program always registers a document type in the system Registry. Rather than pollute the user's system with unnecessary data, I stripped it out entirely. Here are the steps I followed:

First, in the File View, delete the document and view source files. (This removes them from the project, but remember that you must manually delete them outside the environment to make them really go away.) While you're at it, delete the doc and view header files, too. Next, modify the Mainfrm.h header file so that the CMainFrame() constructor is public.

The biggest change you'll make is to the application object's InitInstance() function. Figure 4 shows the necessary code. You must explicitly instantiate a CMainFrame

object, call its LoadFrame() method directly, save its handle, and display it. The entire document template is removed, because it's not needed. I call ShowWindow(SW_HIDE) because I do not want the user to see my window, but you can use this technique even if you have a fully visible, interactive frame window.

Once you've made these changes, the document/view architecture will be completely removed from your application, and the system Registry will not be touched.

USING THE SYSTEM TRAY

Since TrayLaunch has no visible window, I had to provide some other means of interacting with the program. This is done entirely through the system tray icon. Windows provides an extremely simple interface to the system tray: the API function Shell_NotifyIcon(message, ptr). There are only three possible message constants: NIM_ADD, NIM_DELETE, and NIM_MODIFY. The ptr parameter is a pointer to a NOTIFYICONDATA structure, which is declared as follows:

```
typedef struct _NOTIFYICONDATA
{ // nld
    DWORD cbSize;
    // sizeof(NOTIFYICONDATA)
    HWND hWnd;
    UINT uID;
    UINT uFlags;
    UINT uCallbackMessage;
    HICON hIcon;
    char szTip[64];
} NOTIFYICONDATA, *PNOTIFYICONDATA;
```

To set up the structure for use, select a message identifier (I created WM_SYSTEM_TRAY_NOTIFY for this purpose), and copy it into the uCallbackMessage field of the NOTIFYICONDATA structure. The handle for the window that will process that message goes in the hWnd field of that structure, the icon to be displayed goes in the hIcon field, and the ToolTip goes into the szTip field. To add the icon, you call Shell_NotifyIcon().

To process the message, you must modify your application's main message loop. To avoid having to modify my main message loop each time I use a tray icon in a program, I wrote the SystemTrayIcon class, which is contained in the source code files sti.h and sti.cpp. SystemTrayIcon handles all the low-level details that, though not difficult, are tedious to get right. TrayLaunch uses the interface it provides to create a derived class called TrayLaunchTrayIcon (see Figure 5).

The override of ModifyMenu() is typical of SystemTrayIcon use and lets you modify the static menu. TrayLaunchTrayIcon::ModifyMenu() simply calls a special function, SetupTrayMenu(), in the main frame itself. I handled it this way because I don't

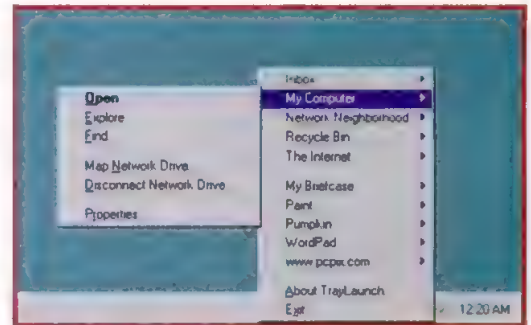


FIGURE 2: Right-click the green TrayLaunch icon to display a menu of all the icons on your desktop, including system utilities put there by Windows.

want the icon object to contain all the data and code for searching and handling the shell's namespace. The main frame object is a more traditional location for that sort of processing.

The override of OnLButtonDblClick()—which is called when the system tray icon is double-clicked with the left mouse button—is more unusual. The base-class implementation activates the main window, but TrayLaunch doesn't have a main window we want to show the user. With the override, a double click posts a message to the main frame to display the About box instead of the main window.

The SystemTrayIcon object needs to know which menu to display when the right mouse button is clicked on the icon, and the window to which the chosen menu commands must be sent. This is handled by SetupTrayIcon():

```
void CMainFrame::SetupTrayIcon() {
    m_systrayicon.SetWindow(this);
    m_systrayicon.SetMainFrame(this);
    m_systrayicon.SetIcon(IDR_MAINFRAME);
    m_systrayicon.SetToolTip("TrayLaunch");
    m_systrayicon.SetMenuID(IDR_MAINFRAME);
    m_systrayicon.Enable(TRUE);
}
```

SetupTrayIcon() is called after the main frame window has been fully created; this is necessary because the main window's handle must be passed as a field of the NOTIFYICONDATA structure. The call to m_systrayicon.Enable(TRUE) actually displays the icon.

That's all we need to handle the system tray icon. When the main frame window is destroyed, the embedded TrayLaunchTrayIcon will also be destroyed; its destructor will take care of removing the system tray icon.



FIGURE 1: When you run TrayLaunch, its icon, a green light, is placed in your system tray at the far end of the Taskbar.



FIGURE 3: The context menu displayed when you right-click on the My Computer icon contains a few additional items that are not relevant to the TrayLaunch version.

BROWSING THE NAMESPACE

So far, I've discussed how to enable TrayLaunch to receive input from the user. Now all we need to do is note every object on the Windows desktop and present all those items and their associated pop-up menus. This is done with OLE (Object Linking and Embedding). Not so long ago, every single article that dealt even peripherally with OLE was obliged to provide a complete OLE tutorial. I suspect you've read enough of these by now, so let's dive right in.

Here's the setup. The user has right-clicked on the system tray icon representing TrayLaunch. The TrayLaunchTrayIcon class has created a pop-up menu for display to the user. So far, this menu contains only the About TrayLaunch and Exit entries. To add entries for the desktop items, the menu is passed to the main frame window as a parameter to SetupTrayMenu():

```
void CMainFrame::SetupTrayMenu
(CMenu* menu) {
    ASSERT(menu);
    if (!menu) return;
    ASSERT(menu->m_hMenu);
    if (!menu->m_hMenu) return;
    m_DesktopArray.FillFromDesktop();
    if (m_DesktopArray.HasItems()) {
        m_DesktopArray.AddAllItemsToMenu(menu);
    }
}
```

CMainFrame delegates the OLE work to a helper class, DesktopArray. The m_DesktopArray member of CMainFrame (an instantiation of the DesktopArray type) is responsible for querying the desktop and storing enough information so that when a command is chosen from the menu, DesktopArray can ex-

ecute it. First, m_DesktopArray attempts to get the desktop icon data. If successful, m_DesktopArray is called again to add items to the menu passed to it from the TrayLaunchTrayIcon class.

The DesktopArray::FillFromDesktop() function must access the Windows namespace. Our entry into the namespace comes courtesy of the function SHGetDesktopFolder(). This provides us with an IShellFolder interface pointer, which points to the Windows desktop. We can't use the legacy functions _findfirst() and _findnext(), because the Windows namespace includes items that are not in the file system. For example, there is no file that corresponds to the My Computer icon on the desktop. What drive could possibly hold it, since My Computer contains all your drives? The Recycle Bin is a single object, but it contains items spread across all your drives. It, too, is outside the file system. In addition, we need more than just filenames; the Windows shell has the information we need.

The first thing we'll do with our IShellFolder interface is call its EnumObjects() method. This provides us with a pointer to an enumeration ID list, which in turn gives us the method Next(). Each time we successfully call Next(), we receive yet another pointer. This pointer, called a PIDL (pronounced "piddle"), is what we are really after. It points to a Windows-desktop item's description, from which we can extract the context-menu items and other essential data. Each time we receive a new pointer, we get a description of another item.

The first call using the pidl variable is

```
BOOL CTrayLaunchApp::InitInstance()
{
    CMainFrame* pMainFrame = new CMainFrame;
    if (!pMainFrame->LoadFrame(IDR_MAINFRAME, WS_OVERLAPPEDWINDOW))
        return FALSE;
    m_pMainWnd = pMainFrame;           // save window handle
    m_pMainWnd->ShowWindow(SW_HIDE);
    m_pMainWnd->UpdateWindow();

    return TRUE;
}
```

FIGURE 4: If you remove the document/view architecture from an MFC SDI application, this code must be placed in the application object's InitInstance() function.

to IShellFolder::GetDisplayNameOf(). This name is what will eventually appear in the pop-up menu—for example, "My Computer." Next, we call IShellFolder::GetAttributesOf() with the parameter SFGAO_FILESYSTEM. This parameter tells Windows that we want to know whether the PIDL refers to an item that is part of the file system. We will use this information later to separate the non-file-system objects from the file-system objects in the displayed menu.

The last action FillFromDesktop() performs is to obtain a pointer to an IContext-

Menu interface. This is done with a call to IShellFolder::GetUIObjectOf(). The pointer to IContextMenu, along with the PIDL and the file-system attributes, is stored in an array called m_arr. Every item that will appear in the main pop-up menu will have one m_arr entry with a display name, an IContextMenu pointer, a PIDL, and the attribute. In this way, we obtain all the information needed for the desktop-item entries.

FillFromDesktop() returns once it has enumerated the entire desktop. Assuming it has found at least one item, the call to HasItems() will return TRUE, and AddAllItemsToMenu() gets to do its job. I wanted the items on the menu to be presented in alphabetical order, with non-file-system entries all listed above file-system entries. To do this, I created an indexing array called sortarr, in which each array element initially contains its own index. Then I used quicksort() to sort the indexing array based on the data contained in DesktopArray's m_arr member. This approach is much faster than moving all of the desktop-entry items around. Once the sortarr was sorted, I then used its elements as indexes into the m_arr array.

BUILDING THE TRAYLAUNCH MENU

The most difficult programming challenge in TrayLaunch was the actual building of the TrayLaunch menu of desktop items. To do this, I used the IContextMenu COM interface. The most common use of this interface is to provide specialized context-menu choices for particular file types. For example, WinZip



adds Extract To to context menus for .ZIP files. It's much less common for a program to create an IContextMenu, but that's just what TrayLaunch has to do.

What we want to accomplish here is the creation of an entry in our main pop-up menu for each item on the desktop. We want to link each item to a pop-up submenu that will have the context-menu commands for that item, so we'll need several menus. Since we must be able to tell one menu's selections from another's, they cannot share any menu IDs.

Obviously it's impossible for the imple-


```

class TrayLaunchTrayIcon : public SystemTrayIcon {
public:
    void SetMainFrame(CMainFrame* pmainframe) {
        m_mainframe = pmainframe;
    }
protected:
    virtual void ModifyMenu(CMenu* menu);
    virtual void OnLButtonDblClick();
private:
    CMainFrame* m_mainframe;
};

void TrayLaunchTrayIcon::ModifyMenu(CMenu* menu) {
    m_mainframe->SetupTrayMenu(menu);
}

void TrayLaunchTrayIcon::OnLButtonDblClick() {
    m_mainframe->PostMessage(WM_COMMAND, ID_APP_ABOUT);
}

```

FIGURE 5: The *TrayLaunchTrayIcon* class allows on-the-fly modification of the system tray icon's menu and, with a double click of the icon, shows an About box for TrayLaunch.

menter of an arbitrary item on the desktop to come up with unique menu IDs that nobody else could use. So when we ask the *IContextMenu* interface object to fill up our pop-up menu, we tell it (through parameters to its *QueryContextMenu()* function) precisely which identifiers it may use.

In theory, the menu handler is supposed to start with the number provided as *iCmdFirst*, the first number in the range. But my first implementation of *TrayLaunch* crashed, because not all context-menu handlers follow the rules. For example, the dial-up networking tool creates shortcuts that use identifiers at the far end of the number range. Since I could not trust the handlers to behave correctly, I had to separate the identifiers supplied by the *IContextMenu* interfaces from the identifiers used in *TrayLaunch*'s own menu. It took a bit

process of elimination—and borne out by my own empirical tests—I determined that *CMF_NORMAL* was the optimal choice.

Once the pop-up menu has been filled, the function *ProcessMenuIntoInvoker()* is called. This function provides the mapping between my assigned menu identifiers and the actual ones used by the application. *ProcessMenuIntoInvoker()* is also responsible for removing irrelevant menu items. It stores the menu identifiers for each pop-up menu into an array. Since I use sequential menu identifiers, I can use this array to retrieve the context-menu pointer and the original menu ID so the *IContextMenu* interface object can process it.

The *ProcessMenuIntoInvoker()* function loops over each of the items in the passed-in pop-up menu. If the item is a separator, it is left in place and is otherwise ignored. If it's an

of work but is the only practical solution.

Last, I had to decide which menu items to add. This last parameter of *QueryContextMenu()* may be one of four constants, each of which produces a different set of items in the resulting pop-up menu. Neither *CMF_DEFAULTONLY* (for default processing only) nor *CMF_VERBSONLY* (ignored by context-menu handlers) will give us what we want. The two remaining choices are *CMF_EXPLORE* and *CMF_NORMAL*. The documentation says that *CMF_EXPLORE* is to be used "if the context menu is for an object in the left pane of the Explorer." By

irrelevant command, it's deleted. These include *Create Shortcut*, *Cut*, and *Copy*, which don't serve a useful purpose unless you're operating directly on a desktop icon. If an item is a valid command, I call the *SetMenuItemInfo()* API function to change its menu identifier from the *IContextMenu*-supplied value to the next sequential identifier value. I also take this opportunity to find out whether the menu item is enabled by calling *CMenu::GetMenuState()*. This lets me set it correctly later.

The last bit of code is easy. When the pop-up menu with our nicely renumbered identifier is finally invoked, *DesktopArray::ExecuteCommandID()* is called. The incoming identifier is translated through the invoker array to the original identifier supplied by the *QueryContextMenu* function and a *IContextMenu* interface pointer. The pointer is used to call the interface's *InvokeCommand()* function. And that's it!

One more quick note on the OLE portion of this exercise. The *TrayLaunch* menu sometimes seems a bit slow to load and display. Why? Is all that shuffling I had to do just too much overhead? No, it turns out that OLE is slow all by itself, without any help from me. To demonstrate this to yourself, use the Desktop folder workaround mentioned at the beginning of this column. Even on a fast Pentium system, it can take several seconds for the window to display—about the same amount of time it takes *TrayLaunch* to pop up its window.

TrayLaunch provides a significant extension to the Windows interface. It's simple to install and use, but behind this simplicity is some fancy footwork. I hope that *TrayLaunch* makes it easier for you to work with Windows 95. □

John Deurbrouck is a longtime Windows and DOS programmer. He works for a database company in the Seattle area.

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PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

User-to-User

By Neil J. Rubenking

Microsoft Solves a Disk Problem

I recently added a second hard disk to my computer. I had no problems installing the disk, and I formatted it as partitions D: and E:. Under Windows 95, everything seemed fine. When I issued a directory command in a DOS window, all the drives were recognized correctly. But if I restarted the computer in DOS mode and ran DIR, neither the files, the folders, nor the volume labels on the D: and E: drives were reported. The system, which was able to read the C: drive correctly, allowed me to create, read, and delete new files on the D: and E: drives without indicating any of the existing files.

I found a solution on Microsoft's Web site. The driver update that solves the problem may, according to Microsoft, "in certain specific configurations, lead to corrupted data on extended partitions on large IDE drives." The problem only occurs on Enhanced IDE hard disks larger than 504MB that are accessed using LBA (Logical Block Addressing). In addition, the disk must have been partitioned with Windows 95 FDISK or with another utility that "creates MS-DOS extended partition types 0x0E and 0x0F." And the system BIOS must support extended INT13 services for hard disks.

On a system that fits this profile, if you exit to DOS from Windows 95 without rebooting, the system may not see the contents of the extended partitions. Writing to the drives while in this state can corrupt the data. This is exactly what happened to me. These details and the new driver can be found by going to www.microsoft.com and searching on LBA or on EIDE.

DOUG THOMAS
Carmichael, California

PC MAGAZINE: The defining symptom of this problem is that one or more of your disk partitions will enter a kind of limbo state when you restart the system in DOS mode. The system recognizes the partitions as valid drives but fails to display any of their files or folders. If this happens to you, be extremely careful not to create any new files or directories while the system is in this limbo state. Writing to the disk can corrupt existing files or render entire directories inaccessible. Immediately restart

the computer and boot into Windows 95. If your system is Internet-enabled, get that driver update right away. If not, have a friend, colleague, or neighbor get it for you. Continuing to use your computer without getting the update is like playing Russian roulette!

Rename Files Using Sequential Numbers

On the Internet a while back, I came across a request for a way to rename the files in a directory in sequentially numbered order. The question has come up several times over the past year or so, along with other, similar requests for numbered sequences. While I did succeed in developing a procedure to accomplish the file-renaming task, I wasn't too happy with the complexity of the result. But I was finally able to come up with what I believe is a superior approach to the problem. In the process, I discovered a fairly useful technique for generating a number sequence that can be used for a variety of tasks.

The solution to the problem of quickly creating a numbered sequence is illustrated in the example batch file, COUNT.BAT (Figure 1). Conceptually, the routine is not simple, but COUNT.BAT has just eight working lines, uses no secondary files, and calls only one external routine, COMMAND.COM. The main trick is the use of replaceable command line arguments to control the flow of the procedure. In particular, a string consisting of a pair of colons is used as a command line argument, and selected batch-file lines are prefixed with one or more of the replaceable command line arguments. The treated lines are converted into comments on the subsequent recursive calls to the routine. To illustrate the effect, consider the following simple example:

```
@echo off
%1 echo This line displays once.
echo This line displays twice
%1 %0 ::
```

The last line reexecutes the batch file, adding a command line argument of two colons (::). The %1 in the second and fourth lines is replaced by ::, which turns those lines into comments. A number of other strategies do the

HIGHLIGHTS



HARDWARE If you find it annoying that NumLock is on when you start your system, don't despair—there are many ways to get around this. *Page 206.*



ONLINE How to use Windows 95's Dial-Up Networking feature to dial in to CompuServe, and where to find the tools you'll need for the job. *Page 218.*



WORD PROCESSING It may not be obvious, but you can cross-reference footnotes in Microsoft Word instead of numbering them sequentially. We explain how. *Page 218.*

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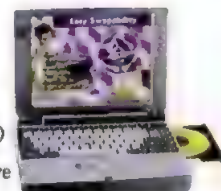
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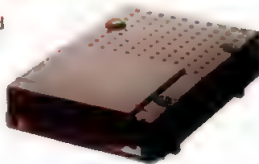


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```

:: COUNT.BAT - A routine that counts to a given number from 000 to 999
@echo %dbgc% off
%5 %4 %3 %2 if [%1]==[] for %%v in (echo goto:End) do %%v Syntax: %0 Number
%5 %4 %3 %2 for %%v in (%comspec% goto:End) do %%v /e:2048 /c %0 %1 ::
%5 for %%v in (0 1 2 3 4 5 6 7 8 9) do call %0 %1 %%v %2 %3 %4
%5 goto End
echo %4%3%2
for %%v in (%2 %3%2 %4%3%2) do if %1==%%v exit
:End

```



FIGURE 1: This odd-looking batch file counts up to the three-digit number specified on its command line.

```

:: #FILES -Renames all of the files in a directory in numbered sequence.
:: Syntax: #FILES [Prefix (up to five characters) [Extension]]
:: Default Prefix is FILE
:: Default Extension is DOC
:: Tom Lavedas <kwh@deltaelectronics.com>
@echo off
%6 %5 %4 %3 if [%1]==[] %0 FILE DOC
%6 %5 %4 %3 if [%1]==[] %0 %1 DOC
%6 %5 %4 %3 for %%v in (c:\dos\undo.bat?) do del %%v
%6 %5 %4 %3 for %%v in (%comspec% goto:End) do %%v /c %0 %1 %2 ::
%6 for %%v in (0 1 2 3 4 5 6 7 8 9) do call %0 %1 %2 %%v %3 %4 %5
%6 goto End
for %%v in (*.*) do %0 %%v %1%5%4%3.%2 goto:Rename
for %%v in (attrib exit) do %%v -h *.*
:Rename
ren %1 %2
>>c:\dos\undo.bat echo ren %2 %1
attrib +h %2
:End

```



FIGURE 2: #FILES.BAT renames all files in the current directory with sequential numbers and even provides an UNDO batch file to restore the original names.

same thing, but none offers such a low overhead in speed and code length. In COUNT.BAT the technique causes the second and third working (noncomment) lines to be executed just once, while the fourth and fifth working lines are executed three times to create each three-digit number from 000 to 999. The control of the recursive call in that fourth line is at the heart of the approach, though there is one more trick to make it all work.

One significant feature of a recursive routine is that it creates a way to exit at the proper time. In this case, this is achieved by launching a secondary command processor in the third working line. Then, when the input number matches the count, an EXIT command is issued, and all pending operations are bypassed. The procedure comes to an immediate halt. Without this feature, the routine would run on to the upper limit of 999 regardless of the input. Applying the counter to the problem of renaming files with sequential numbers required just six lines more, though other structural changes were needed. The resulting batch file, #FILES.BAT (Figure 2), builds filenames using a prefix (FILE by default), a three-digit sequential number, and an extension (.DOC by

default)—for example, FILE042.DOC. Working lines three and four provide these default values if necessary, and the next line clears a file that provides an undo feature. The file manipulation requires another recursive call using the first FOR statement. The FOR in this case converts the wildcard, *, into filenames, one at a time. The filename, number, and flow-control argument are passed to the batch file as new inputs. The lines after the label Rename perform the renaming and then hide the file to remove it from further processing. The procedure continues numbering files in sequence until no unhidden files remain. Control passes to the line immediately before the Rename label, which uses ATTRIB.EXE to reveal all of the renamed files.

The UNDO feature required only two lines of code to institute. If needed, it is run from within the directory where the renamed files are stored. Simply by issuing an UNDO from the DOS prompt, a list of RENAME commands that attempt to reverse the process is run. Errors will result for any file that has been renamed or removed since the numbering process was originally run, but UNDO will restore the rest of the filenames.

It might be of some interest to note that the sequencing approach isn't really counting; rather, it is forming all possible combinations of the ten digit characters, three at a time. A list of letters could just as easily be substituted, or even a list of hexadecimal digits (0 1 2 3 4 5 6 7 8 9 A B C D E F). The procedure works just the same. Also, the use of three-digit numbers is arbitrary. I was successful in building a counter that could conceivably count to 9,999,999—but who would have time to wait for it to finish?

TOM LAVEDAS
Clifton, Virginia

PC MAGAZINE: What can you say about a batch file in which one character out of five is a percent sign? The only way you can really understand COUNT.BAT is by running it under a secondary command processor using the /Y switch. This switch causes the command processor to display each line before executing it. If you press Enter or Y, the line is executed; press Esc or N and the line is skipped. Of course, when you're using the /Y switch to watch a batch file's execution, you must not skip any lines.

One of COUNT.BAT's lines invokes a secondary command processor itself, and you'll have to edit that line to include the /Y switch. In the third working line (the one that ends /c %0 %1 ::), insert the /Y switch before /c. Now, at the command prompt, enter the following command:

COMMAND /Y /C COUNT 001

Examine each line before pressing Enter or Y to continue. Watch for doubled colons appearing at the start of a line—they turn the line into a nonexecutable comment. You may want to keep a printed copy of the batch file handy so you can keep your place during the recursive calls. Limber up your index finger before starting, as counting up to 001 will require you to press Y over 40 times. Don't forget to remove that /Y switch when you've finished studying the batch file.

If you decide to examine #FILES.BAT in the same way, you'll also have to insert the /Y switch. In this case, you put it into the fifth working line, just before /c %0 %1 %2 ::. Do note that #FILES.BAT must not reside in the directory whose files are being renamed with sequential numbers.

To modify COUNT.BAT so that it handles other tasks involving sequential numbers, find the line echo %4%3%2. Replace this line with another line or with lines that perform the desired action on each three-digit number. The string %4%3%2 represents the number—that is, %4 is the hundreds digit, %3 is the tens digit, and %2 is the ones digit. Other modifications may be necessary, depending on the specific counting task.

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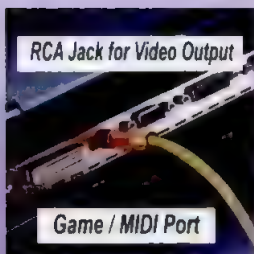
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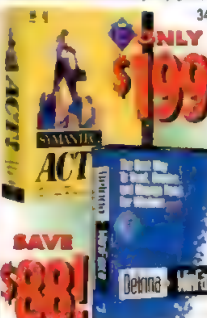
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*I used to run a COBOL program on an old IBM XT, but when I try to run it on my new computer, I get an error message: "***COBOL: PROGRAM TOO BIG TO FIT IN MEMORY***". I can't understand why a program could run in the XT's 512K of memory but not in the 16MB of memory of my new machine. I'm running under DOS, so Windows is not a factor in this problem. Is there a simple solution to the problem, or do I need a programmer to fix it?*

S. WHITE, SR.
Reedville, Virginia

PC MAGAZINE: The memory shortage may seem paradoxical, but in fact, there are two good reasons why your new computer seems to have less memory than your old one.

DOS programs must run in *system memory*—the first 640K of memory installed in your computer. The operating system files also load into this area. Your new computer has more memory installed, but the extra RAM is

available only to programs that can take advantage of extended or expanded memory.

Your XT may actually have more available DOS memory than your new computer, because it's probably running a different version of DOS. As DOS's capabilities have increased, so has the amount of memory it requires. Here's a comparison of the size of the COMMAND.COM file for four different versions of DOS:

Version	COMMAND.COM (size in bytes)
1.1	4,959
3.0	17,792
3.2	23,791
5.0	47,845
6.22	92,870

As you can see, the COMMAND.COM file for DOS 6.22 is nearly 20 times the size of the DOS 1.1 version, and if it is loaded into your system memory, it will consume more than 85K more memory.

Your new computer probably has more features as well, perhaps a CD-ROM drive and a hard-disk cache utility (such as Microsoft's

SmartDrive). These require drivers and programs that also can take a bite out of your system memory. As a result, your new 16MB computer may well have less system memory available than your old XT.

Luckily, there's a solution. Try running the DOS MEMMAKER utility on your system. It will load as many programs and files as it can into memory above the system memory. For example, only 12.4K of system memory is required for the DOS 5.0 COMMAND.COM, because the rest of the program can be loaded into higher memory using the DOS=HIGH command in CONFIG.SYS. You should end up with at least as much system memory available as you did on your 512K XT system, and the COBOL program should have enough memory to run.—*Alfred Poor*

Lock That Num!

I have a program that requires NumLock to be turned off when it runs, but my computer boots up with NumLock on. I know there is a NUM-LOCK command that you can put in your CONFIG.SYS file if you're running DOS 6.x, but I'm still running DOS 5.0 on my system. Do you have any suggestions?

BOB FREIBERG
Fire Island, New York

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486	33MHz	4GB	\$889
486	33MHz	8GB	\$909
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486	33MHz	128GB	\$1189
486	33MHz	256GB	\$1209
486	33MHz	512GB	\$1229
486	33MHz	1GB	\$1249
486	33MHz	2GB	\$1269
486	33MHz	4GB	\$1289
486	33MHz	8GB	\$1309
486	33MHz	16GB	\$1329
486	33MHz	32GB	\$1349
486	33MHz	64GB	\$1369
486	33MHz	128GB	\$1389
486	33MHz	256GB	\$1409
486	33MHz	512GB	\$1429
486	33MHz	1GB	\$1449
486	33MHz	2GB	\$1469
486	33MHz	4GB	\$1489
486	33MHz	8GB	\$1509
486	33MHz	16GB	\$1529
486	33MHz	32GB	\$1549
486	33MHz	64GB	\$1569
486	33MHz	128GB	\$1589
486	33MHz	256GB	\$1609
486	33MHz	512GB	\$1629
486	33MHz	1GB	\$1649
486	33MHz	2GB	\$1669
486	33MHz	4GB	\$1689
486	33MHz	8GB	\$1709
486	33MHz	16GB	\$1729
486	33MHz	32GB	\$1749
486	33MHz	64GB	\$1769
486	33MHz	128GB	\$1789
486	33MHz	256GB	\$1809
486	33MHz	512GB	\$1829
486	33MHz	1GB	\$1849
486	33MHz	2GB	\$1869
486	33MHz	4GB	\$1889
486	33MHz	8GB	\$1909
486	33MHz	16GB	\$1929
486	33MHz	32GB	\$1949
486	33MHz	64GB	\$1969
486	33MHz	128GB	\$1989
486	33MHz	256GB	\$2009
486	33MHz	512GB	\$2029
486	33MHz	1GB	\$2049
486	33MHz	2GB	\$2069
486	33MHz	4GB	\$2089
486	33MHz	8GB	\$2109
486	33MHz	16GB	\$2129
486	33MHz	32GB	\$2149
486	33MHz	64GB	\$2169
486	33MHz	128GB	\$2189
486	33MHz	256GB	\$2209
486	33MHz	512GB	\$2229
486	33MHz	1GB	\$2249
486	33MHz	2GB	\$2269
486	33MHz	4GB	\$2289
486	33MHz	8GB	\$2309
486	33MHz	16GB	\$2329
486	33MHz	32GB	\$2349
486	33MHz	64GB	\$2369
486	33MHz	128GB	\$2389
486	33MHz	256GB	\$2409
486	33MHz	512GB	\$2429
486	33MHz	1GB	\$2449
486	33MHz	2GB	\$2469
486	33MHz	4GB	\$2489
486	33MHz	8GB	\$2509
486	33MHz	16GB	\$2529
486	33MHz	32GB	\$2549
486	33MHz	64GB	\$2569
486	33MHz	128GB	\$2589
486	33MHz	256GB	\$2609
486	33MHz	512GB	\$2629
486	33MHz	1GB	\$2649
486	33MHz	2GB	\$2669
486	33MHz	4GB	\$2689
486	33MHz	8GB	\$2709
486	33MHz	16GB	\$2729
486	33MHz	32GB	\$2749
486	33MHz	64GB	\$2769
486	33MHz	128GB	\$2789
486	33MHz	256GB	\$2809
486	33MHz	512GB	\$2829
486	33MHz	1GB	\$2849
486	33MHz	2GB	\$2869
486	33MHz	4GB	\$2889
486	33MHz	8GB	\$2909
486	33MHz	16GB	\$2929
486	33MHz	32GB	\$2949
486	33MHz	64GB	\$2969
486	33MHz	128GB	\$2989
486	33MHz	256GB	\$3009
486	33MHz	512GB	\$3029
486	33MHz	1GB	\$3049
486	33MHz	2GB	\$3069
486	33MHz	4GB	\$3089
486	33MHz	8GB	\$3109
486	33MHz	16GB	\$3129
486	33MHz	32GB	\$3149
486	33MHz	64GB	\$3169
486	33MHz	128GB	\$3189
486	33MHz	256GB	\$3209
486	33MHz	512GB	\$3229
486	33MHz	1GB	\$3249
486	33MHz	2GB	\$3269
486	33MHz	4GB	\$3289
486	33MHz	8GB	\$3309
486	33MHz	16GB	\$3329
486	33MHz	32GB	\$3349
486	33MHz	64GB	\$3369
486	33MHz	128GB	\$3389
486	33MHz	256GB	\$3409
486	33MHz	512GB	\$3429
486	33MHz	1GB	\$3449
486	33MHz	2GB	\$3469
486	33MHz	4GB	\$3489
486	33MHz	8GB	\$3509
486	33MHz	16GB	\$3529
486	33MHz	32GB	\$3549
486	33MHz	64GB	\$3569
486	33MHz	128GB	\$3589
486	33MHz	256GB	\$3609
486	33MHz	512GB	\$3629
486	33MHz	1GB	\$3649
486	33MHz	2GB	\$3669
486	33MHz	4GB	\$3689
486	33MHz	8GB	\$3709
486	33MHz	16GB	\$3729
486	33MHz	32GB	\$3749
486	33MHz	64GB	\$3769
486	33MHz	128GB	\$3789
486	33MHz	256GB	\$3809
486	33MHz	512GB	\$3829
486	33MHz	1GB	\$3849
486	33MHz	2GB	\$3869
486	33MHz	4GB	\$3889
486	33MHz	8GB	\$3909
486	33MHz	16GB	\$3929
486	33MHz	32GB	\$3949
486	33MHz	64GB	\$3969
486	33MHz	128GB	\$3989
486	33MHz	256GB	\$4009
486	33MHz	512GB	\$4029
486	33MHz	1GB	\$4049
486	33MHz	2GB	\$4069
486	33MHz	4GB	\$4089
486	33MHz	8GB	\$4109
486	33MHz	16GB	\$4129
486	33MHz	32GB	\$4149
486	33MHz	64GB	\$4169
486	33MHz	128GB	\$4189
486	33MHz	256GB	\$4209
486	33MHz	512GB	\$4229
486	33MHz	1GB	\$4249
486	33MHz	2GB	\$4269
486	33MHz	4GB	\$4289
486	33MHz	8GB	\$4309
486	33MHz	16GB	\$4329
486	33MHz	32GB	\$4349
486	33MHz	64GB	\$4369
486	33MHz	128GB	\$4389
486	33MHz	256GB	\$4409
486	33MHz	512GB	\$4429
486	33MHz	1GB	\$4449
486	33MHz	2GB	\$4469
486	33MHz	4GB	\$4489
486	33MHz	8GB	\$4509
486	33MHz	16GB	\$4529
486	33MHz	32GB	\$4549
486	33MHz	64GB	\$4569
486	33MHz	128GB	\$4589
486	33MHz	256GB	\$4609
486	33MHz	512GB	\$4629
486	33MHz	1GB	\$4649
486	33MHz	2GB	\$4669
486	33MHz	4GB	\$4689
486	33MHz	8GB	\$4709
486	33MHz	16GB	\$4729
486	33MHz	32GB	\$4749
486	33MHz	64GB	\$4769
486	33MHz	128GB	\$4789
486	33MHz	256GB	\$4809
486	33MHz	512GB	\$4829
486	33MHz	1GB	\$4849
486	33MHz	2GB	\$4869
486	33MHz	4GB	\$4889
486	33MHz	8GB	\$4909
486	33MHz	16GB	\$4929
486	33MHz	32GB	\$4949
486	33MHz	64GB	\$4969
486	33MHz	128GB	\$4989
486	33MHz	256GB	\$5009
486	33MHz	512GB	\$5029
486	33MHz	1GB	\$5049
486	33MHz	2GB	\$5069
486	33MHz	4GB	\$5089
486	33MHz	8GB	\$5109
486	33MHz	16GB	\$5129
486	33MHz	32GB	\$5149
486	33MHz	64GB	\$5169
486	33MHz	128GB	\$5189
486	33MHz	256GB	\$5209
486	33MHz	512GB	\$5229
486	33MHz	1GB	\$5249
486	33MHz	2GB	\$5269
486	33MHz	4GB	\$5289
486	33MHz	8GB	\$5309
486	33MHz	16GB	\$5329
486	33MHz	32GB	\$5349
486	33MHz	64GB	\$5369
486	33MHz	128GB	\$5389
486	33MHz	256GB	\$5409
486	33MHz	512GB	\$5429
486	33MHz	1GB	\$5449
486	33MHz	2GB	\$5469
486	33MHz	4GB	\$5489
486	33MHz	8GB	\$5509
486	33MHz	16GB	\$5529
486	33MHz	32GB	\$5549
486	33MHz	64GB	\$5569
486	33MHz	128GB	\$5589
486	33MHz	256GB	\$5609
486	33MHz	512GB	\$5629
486	33MHz	1GB	\$5649
486	33MHz	2GB	\$5669
486	33MHz	4GB	\$5689
486	33MHz	8GB	\$5709
486	33MHz	16GB	\$5729
486	33MHz	32GB	\$5749
486	33MHz	64GB	\$5769
486	33MHz	128GB	\$5789
486	33MHz	256GB	\$5809
486	33MHz	512GB	\$5829
486	33MHz	1GB	\$5849
486	33MHz	2GB	\$5869
486	33MHz	4GB	\$5889
486	33MHz	8GB	\$5909
486	33MHz	16GB	\$5929
486	33MHz	32GB	\$5949
486	33MHz	64GB	\$5969
486	33MHz	128GB	\$5989
486	33MHz	256GB	\$6009
486	33MHz	512GB	\$6029
486	33MHz	1GB	\$6049
486	33MHz	2GB	\$6069
486	33MHz	4GB	\$6089
486	33MHz	8GB	\$6109
486	33MHz	16GB	\$6129
486	33MHz	32GB	\$6149
486	33MHz	64GB	\$6169
486	33MHz	128GB	\$6189
486	33MHz	256GB	\$6209
486	33MHz	512GB	\$6229
486	33MHz	1GB	\$6249
486	33MHz	2GB	\$6269
486	33MHz	4GB	\$6289
486	33MHz	8GB	\$6309
486	33MHz	16GB	\$6329
486	33MHz	32GB	\$6349
486	33MHz	64GB	\$6369
486	33MHz	128GB	\$6389</

MicroWAR

CD RECORDERS - BUILD YOUR OWN KIT!

It's as easy as 1,2,3,4,5!

(Please note: Software, controller, and media prices listed in this box are good only with the purchase of a CD Recorder drive. Please call for individual pricing.)

1 - CHOOSE YOUR DRIVE

2K4 Ricoh, 2MB Buffer (RD1420C2M)	\$379
2K4 JVC (JVC2010)	\$399
4K4 Teac, tray loading (CDR50S)	\$499
4K4 Yamaha (YCDR100)	\$719

2 - CHOOSE INTERNAL OR EXTERNAL

If internal - go on to step 3. If external, add an external case (EXTCDCASE) \$100, and the proper cable. We will even install the drive in the case for you.

3 - CHOOSE YOUR SOFTWARE

Corel CD Creator Pro for PC	\$40
-Supports Windows 3.1, 95, NT (CORELCPRO)	
Incat Easy-CD	\$60
-Supports Windows 3.1, 95, NT (INCATPC)	
Astare Toast CD-ROM Pro	\$85
-Supports Macintosh (TOAST)	
Elektron Gear Multimedia for PC	\$69
-Supports OS/2, Windows 3.1, 95, NT	
-Also supports Macintosh (GEAR)	
Creative Digital Research CDR HYCD for PC	\$359
-Supports Windows 3.1, 95, NT	
-Creates hybrid CDs for PC/Mac/Unix (CDRHYWIN)	
Creative Digital Research CDR HYCD for Unix	\$1299
-For Unix workstations	
-Creates hybrid CDs for PC/Mac/Unix (CDRHYUNIX)	

4 - CHOOSE YOUR SCSI CONTROLLER

16Bit ISA PIO Adaptec (A1505CDKIT)	\$50
16Bit ISA Bus Master Advansys (ABP5140)	\$95
32Bit PCI Bus Master Advansys (ABP940)	\$125
32Bit PCI PIO Adaptec (A2920KIT)	\$159
32Bit PCI Bus Master Adaptec (A2930KIT)	\$189

5 - CHOOSE YOUR BLANK MEDIA

5 Pack (CDR74-5)	\$40
20 Pack (CDR74-20)	\$149
50 Pack (CDR74-50)	\$359
100 Pack (CDR74-100)	\$699
300 Pack CDR Labels, template software, and applicator	\$799

Turn a Hard Drive Into a Removable

Converts any 3 1/2" hard drive into a removable drive. Great for transportability, data interchange, or security needs. Extremely high quality construction. Metal cartridge and frame, cooling fan. Unit has SCSI ID select on the cartridge. Qty discounts available.

	System	Extra Cartridge	Extra Frame
IDE	\$79	\$39	\$49
SCSI	\$85	\$40	\$54
WIDE SCSI	\$129	\$64	\$75

Weather resistant case to store and transport cartridge \$55

OPTICALS

All Optical Drive prices below include 1 FREE cartridge

230MB Fujitsu IDE	\$339
230MB Smart Storage Solutions SCSI	\$339
640MB Smart Storage Solutions SCSI	\$539
640MB Fujitsu (230MB backwards compatible)	\$555
650MB Toray 4xCD and 640MB Optical comb.	\$299
2.6Gig Smart Storage Solutions	\$1649
2.6Gig Maxoptix	\$1699
2.6Gig Hewlett Packard	\$2199
52Gig Maxoptix (does not include free disks)	\$4549

REMOVABLES

540MB MCD Call about manufacturer's \$50 rebate - good until 3/15/97
Compatible w/ SyQuest 270MB media. SCSI Int/Ext. \$249/\$299
SyQuest

230MB Flyer compatible with EZ135MB disks
External SCSI or parallel with 1 free disk \$299
Call about SyQuest \$55 mail-in rebate - until 2/28/97!

100MB Zip

External SCSI with 1 disk/Ext Parallel with 1 disk \$189/\$189

1 GB Jaz

Internal SCSI with 1 disk/Ext SCSI with 1 disk \$379/\$469

Toray

PD Drive - 650MB optical & 4X CD ROM in one unit!
Kit with 3 free disks & controller Int. \$299 Ext. \$399

CD RECORDERS

These COMPLETE KITS include drive, controller, software, and 1 recordable CD disk. Smart Storage Solutions kit includes 5 FREE recordable CD disks!

Smart Storage Solutions	2X Write 4X Read	\$469
Hewlett Packard	2X Write 6X Read	\$599
Ricoh	2X Write 4X Read	\$475
Teac	4X Write 4X Read	\$829
Smart Storage Solutions	4X Write 4X Read	\$889
Yamaha	4X Write 4X Read	\$759

CD ROM DRIVES

SCSI

Brand	Spin	Model	Speed	Int	Ext
NEC	4X	CDR222	200ms	\$99	\$189
Plextor	6X	PX63CS	145ms	\$269	\$359
Philips	8X	PC80S	195ms	\$205	\$305
NEC	8X	CDR1410	145ms	\$205	\$295
Plextor	8X	PX83CS	115ms	\$299	\$389
Plextor	12X	PX12TS	105ms	\$319	\$409
Plextor	12X	PX12CS	105ms	\$349	\$439

ATAPI IDE

Brand	Spin	Model	Speed	Int	Ext
NEC	8X	CDR1400	140ms	\$110	\$140
Mitsumi	8X	CRMCFX800	150ms	\$110	\$140
Acer	10X	AC910A	150ms	\$125	\$155
Pioneer	10X	DRA10X	140ms	\$135	\$165
Lite On	12X	LTN126A	155ms	\$129	\$159
Acer	12X	AC612A	125ms	\$149	\$179
Cyber	12X	CYBER12X	150ms	\$115	\$145
Mitsumi	12X	CRMCFX12X	150ms	\$175	\$205

Toshiba 15X Coming soon! Call.

IDE CD ROM CHANGER

NEC	4X	CDR4X4	4 Disk	250ms	\$99
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SCSI CD ROM CHANGERS

Nakamichi	8X	MJ48S	4 Disk	150ms	\$299
Pioneer	4.4X	DRM-624X	6 Disk	190ms	\$379

TAPE DRIVES

QIC MINICARTRIDGE (SAVE \$10 with hard drive purchase)

Includes DOS/Win backup software and 1 free tape.			
800MB	Seagate	TST800R	\$119
3.2Gig	Seagate	TST3200RFT	\$215

PRINTER PORT MINICARTRIDGE

Includes DOS/Win backup software.			
800MB	Seagate	TST800RP	\$160
3.2Gig	Seagate	TST3200RP	\$259

IDE or SCSI TRAVAN (SAVE \$10 with hard drive purchase)

Includes DOS/Win backup software and 1 free tape.			
4-8GB	Seagate	TST8000(A)	\$369

SCSI 4mm DAT

2GB Hewlett Packard	C1534AI	\$609
2-4GB Seagate	C4324RP	\$679
2-4GB Hewlett Packard	C1536AI	\$699
4-8GB Sony	SDT5000AI	\$809
4-8GB Seagate	C4326NP (DD52)	\$859
4-8GB Hewlett Packard	C1533AI	\$929

4-8GB Sony	SDT7000	\$909
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TURBO SPEED 46MB/sec uncompressed or 90MB/sec with onboard compression!

24-48GB HP	External 6 tape loader C1553AX	\$2299
32-64GB Sony	TSL7000 8 tape autoloader	\$2199
48-96GB Seagate	C4586NP 12 tape autoloader	\$2399

SCSI 1mm DAT

3.5-7GB Exabyte	EXB8205XL	\$1269
7-14GB Exabyte	EXB8505XL	\$1789
7-14GB Exabyte	EXB8700LT	\$1029
20-40GB Exabyte	EXB8900	\$4999
70-140GB Exabyte	EXB10H 10 tape autoloader	\$4939

SCSI DLT 20-40GB Quantum DLT4000 \$4699

BACKUP SOFTWARE (SAVE \$10 with hard drive purchase)

NovaStor's NovaBack CD contains software for DOS, Win 3.1, Win 95, OS/2, Warp, and Macintosh \$79
NovaStor's NovaDisk CD contains software to backup to disk drives and removables \$79
Seagate Arcadia for Windows NT (call for network version) workstation/single server/enterprise \$239/499/869
TAPEDISK, allows DAT drive to be used as hard drive under DOS/Win 3.1, Win 95 \$189
Call for the best prices in the industry on backup tapes!

IDE HARD DRIVES

IDE	Speed	RPM	Brand	Model	Wty	Price
631MB	14ms	3600	Seagate	ST3630A	3	\$145
1200MB	10ms	5400	Fujitsu	M1636T	3	\$195
1275MB	12ms	4500	Seagate	ST31276A	3	\$195
1280MB	11ms	4500	Quantum	TM31280A	3	\$195
1281MB	11ms	5200	Western Digital	WDAC21200	3	\$199
1330MB	12ms	4480	Maxtor	M71336A	3	\$199
1624MB	10ms	5200	Western Digital	WDAC21600	3	\$219
1670MB	11ms	4480	Maxtor	M71670A	3	\$215
1700MB	10ms	5400	Fujitsu	M1623T	3	\$215
1700MB	12ms	4500	Seagate	ST31720A	3	\$215
2004MB	11ms	4480	Maxtor	M72004A	3	\$255
2100MB	11ms	5200	Western Digital	WDAC22100	3	\$249
2100MB	9ms	5400	Fujitsu	M1624T	3	\$235
2132MB	12.5ms	4500	Seagate	ST32132A	3	\$247
2168MB	10.5ms	4500	Quantum	TM32168A	3	\$259
2500MB 9ms 5400 Fujitsu M1638T \$255						
2550MB	15ms	3600	Quantum	BF2500A	3	\$242
2559MB	11ms	5200	Western Digital	WDAC32500	3	\$275
2560MB	11ms	5400	Seagate	ST52520A	3	\$275
2700MB	12ms	4480	Maxtor	M72700A	3	\$279
3166MB	12ms	5200	Western Digital	WDAC33100	3	\$302
3254MB	10.5ms	4500	Quantum	TM33200A	3	\$299
3500MB	12ms	4480	Maxtor	M83500A	3	\$369
3840MB	10.5ms	4500	Quantum	TM33840A	3	\$359

SCSI HARD DRIVES

SCSI	Speed	RPM	Brand	Model	Wty	Int	Ext
1050MB	9ms	5400	Seagate	ST31055N	3	\$339	\$399
1280MB	12ms	4500	Quantum	TM31280S	3	\$279	\$339
2050MB	8.5ms	7200	Micropolis	MC4221	5	\$545	\$599
2110MB	10.5ms	4500	Quantum	TM32110S	3	\$375	\$435
2147MB	9ms	5400	Micropolis	MC4421	5	\$369	\$429
2147MB	9ms	5400	Micropolis	MC4421AV	5	\$429	\$489
2147MB	8ms	7200	Seagate	ST32550N	5	\$729	\$789
2150MB	9ms	5400	Seagate	ST32155N	5	\$479	\$539
2150MB	8ms	7200	Seagate	ST32171N	5	\$739	\$799
3254MB	10.5ms	4500	Quantum	TM33200S	3	\$399	\$459
4294MB	8ms	7200	Seagate	ST15230N	5	\$885	\$945
4294MB	8ms	7200	Micropolis	MC3343	5	\$829	\$889
4294MB	8ms	7200	Micropolis	MC3243AV	5	\$939	\$999
4350MB	8ms	7200	Seagate	ST34371N	5	\$1145	\$1205
4400MB	8ms	7200	Fujitsu	M2954S	5	\$819	\$879
4550MB	8ms	7200	Quantum	XP34550S	5	\$999	\$1059
4550MB	7.9ms	7200	Micropolis	MC4345	5	\$989	\$1049
6000MB	11ms	5400	Seagate	ST41000N	5	\$1179	\$1879
6001MB	8.5ms	7200	Micropolis	MC3331	5	\$1759	\$1819
9100MB	9ms	7200	Seagate	ST19171N	5	\$2085	\$2145
9100MB	8ms	7200	Quantum	XP33100N	5	\$1599	\$1659
9100MB	10ms	7200	Fujitsu	M2940S	5	\$2069	\$2129

WIDE SCSI

1050MB	9ms	5400	Seagate	ST31055W	5	\$379	\$509
2150MB	9ms	5400	Seagate	ST32155W	5	\$529	\$659
2150MB	9ms	7200	Seagate	ST32171W	5	\$779	\$909
4294MB	8ms	7200	Micropolis	MC3243W	5	\$929	\$1059
4294MB	8ms	7200	Micropolis	MC3243WD	5	\$899	\$1029
4294MB	8ms	7200	Micropolis	MC3243WAV	5	\$999	\$1139
4350MB	8ms	7200	Seagate	ST34371W	5	\$1189	\$1379
4550MB	7.9ms	7200	Micropolis	MC4345W	5	\$1020	\$1130
4550MB	8ms	7200	Quantum	XP34550W	5	\$999	\$1059
9091MB	8.5ms	7200	Micropolis	MC3391W	5	\$1809	\$1949
9100MB	11ms	5400	Seagate	ST41000W	5	\$2029	\$2219
9100MB	9ms	7200	Seagate	ST19171W	5	\$2149	\$2279
9100MB	8ms	7200	Quantum	XP39100W	5	\$1599	\$1659

Get an Adaptec wide PCI [A2940W/KIT] for only \$289 when purchased with any Micropolis wide SCSI drive.

MegaHaus

2201 Pine Drive, Dickinson, Texas 77539
(281)534-3919 FAX (281)534-6580

Prices & specifications subject to change without notice. Shipping charges are \$10.00. Returns must be in new condition and in original packaging. Defective items may be returned. No returns on software or special order items. Not valid in all states. All returns subject to 14-day inspection period. All trademarks are registered trademarks of their respective companies. Personal checks held for clearance. We reserve the right to refuse any sale for any reason. Bundle price good only if sold at retail price. ©1996 MegaHaus Inc.

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Multimedia Power in a Portable Design!

- Up to 133MHz Pentium® Processor
- 8MB RAM (M100D) & 16MB RAM (M120T, M133T) std., 48mb max.
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- 256K synchronous L2 Cache
- 11.3" Dual (M100D) and 11.8" Active Matrix Display (M120T, M133T)
- SoundBlaster Pro compatible audio
- Built-in 4X (M100D, M120T) and 6X CD-ROM (M133T)
- One Type III or Two Type II PCMCIA Slots

Integrated 10 Base-T Ethernet card and built-in 28.8 Kbps Voice/Vox modem

5 year warranty



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HITACHI E™ Series

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- Pre-installed 28.8 Kbps cellular-ready PC card modem
- NeoMagic 128-bit graphics accelerator
- 1MB video memory
- Two Type II or One Type III PCMCIA slots
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- 1 year warranty



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- Built-in 33.6 Kbps modem
- 8X CD-ROM Drive
- 2MB DRAM video memory

5 year warranty



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PC MAGAZINE: Fortunately, there are many freeware and shareware utilities that can solve your problem, but first check the CMOS configuration options for your computer. In many machines, the BIOS lets you select the status you want for NumLock on boot-up.

If your computer doesn't offer that feature, check the software collections available for downloading. If you have access to the ZD Net service on CompuServe, use the GO ZDN:FILEFIND command to use the search feature to find programs with the keyword "NUMLOCK." You'll find a number of programs you can use in your AUTOEXEC.BAT file to set the status of the NumLock key, including the utility NUMOFF.COM. On the Web, go to www.zdnet.com and choose the Software Library button. Then use the search feature to find programs that include NumLock utilities, such as JW-Utils (freeware) and Better Command Utilities (shareware registration fee, \$11.95).

—Alfred Poor

Update: Using a Tape Drive as a Disk Drive

PC MAGAZINE: In our October 8, 1996, column, I mentioned TAPEDISK as a product that lets your computer use a tape drive as if it were a disk drive, and may have thus given readers a false impression about the product. TAPEDISK maintains a copy of its FAT (File Allocation Table) data in memory, so it does not have to keep going back and forth between the file and FAT data stored on the tape itself. The FAT is updated incrementally as files are changed during a session and is then rewritten in one block when the tape is unloaded. Even though this gives the program increased performance, "using TAPEDISK to replace a real-live hard disk in all situations is not recommended," says Ralph Shnelvar, president of TAPEDISK Corp.

—Alfred Poor

OPERATING ENVIRONMENTS

Changing the Windows 95 Logo Screen



It was pretty easy to change the start-up logo in Windows 3.1 by building a new copy of WIN.COM, incorporating the new logo as a 16-color, 640-by-480, RLE-compressed bitmap. Is there a way to change the Windows 95 start-up logo? I know you can disable it by setting Logo to 0 in the Options section of MSDOS.SYS, but I'd like to replace it with something more personal.

ED GREEN
Washington, D.C.

PC MAGAZINE: Changing the logo screen in Windows 95 is even simpler than in Windows 3.x, as it doesn't involve using the uncommon RLE format. The screen can be stored in the file LOGO.SYS, in the root directory of the boot drive. If it's present, load this file into Paint after making a backup copy. You'll find it's a squashed-looking, 320-by-400, 256-color bitmap. During the loading process, Windows 95 stretches it to 640-by-400. To edit the existing screen, select Stretch/Skew from the Image menu and stretch the image to 200 percent horizontally. If you want to create an all-new logo bitmap, start with a 640-by-400, 256-color image. In either case, use the Stretch/Skew tool to reduce the file by 50 percent horizontally before saving it.

The standard logo screen has a color bar across the bottom that seems to move. This animation is produced by cycling the colors assigned to the last 20 entries in the 256-color palette. If you make changes to LOGO.SYS and save it, however, the animation disappears. To restore the animation, load LOGO.SYS into DEBUG and enter these commands at the prompt:

```
E CS:132 EC
■
Q
```

You can actually expand on this feature to animate your own logo screen. Just start with the existing logo screen and erase everything except the animated color bar. Use the dropper tool in Paint to pick up color from a portion of the animated bar, then paint something else on the screen with that color. Whatever you paint will change color along with the animated color bar.—Neil J. Rubenking

Prevent Users from Invoking Multiple DOS Sessions

Is there some way I can prevent users from invoking more than one session of DOS under Windows 95? Sometimes users double-click on the icon more than once, then wonder why they are getting conflicts in their programs.

YOSSI GOURARIE
via ZD Net

PC MAGAZINE: What you really need is a way to prevent users from running multiple instances of a particular DOS program. That makes sense, as many DOS programs were written without any thought for multitasking or file sharing. You can use a batch file to pre-

```
@ECHO OFF
DIR "C:\MyProg is already running" /b
IF EXIST "C:\MyProg is already running" GOTO End
REM > "C:\MyProg is already running"
START MYPROG$.EXE /W
DEL "C:\MyProg is already running"
:End
```

FIGURE 1: By running the DOS-based MYPROG\$.EXE from this batch file, you can restrict it to a single instance and thereby avoid file-sharing problems.

vent your users from running multiple instances accidentally.

Suppose you want to permit just one instance of MYPROG.EXE. First, rename the .EXE file itself to, say, MYPROG\$.EXE. Now create a batch file named MYPROG.BAT (modeled after the batch file in Figure 1). Edit any and all shortcuts that point to MYPROG.EXE so that they now point to MYPROG.BAT.

When a user launches MYPROG.BAT, the batch file checks to see whether a certain zero-byte semaphore file is present in the root directory of C:\. If so, MYPROG\$.EXE is already running, and the batch file exits. In a triumph of recycling, the zero-byte file's name does double-duty as an error message. If the semaphore file was not found, the batch file creates it, and then launches MYPROG\$.EXE using the Start command. The /W switch causes Start to wait until the launched program terminates before returning control to the batch file. At this point, the batch file deletes the semaphore, and the system is ready to invoke the DOS-based program once again.

You can apply this technique to all of your DOS-based programs that should run in only one instance, using a different semaphore filename for each. And for safety's sake, add lines to your AUTOEXEC.BAT that delete all of the temporary files at start-up. That way, you'll start with a clean slate, even if one of the programs crashes.—Neil J. Rubenking

Windows Start-Up Parameters

I run DOS FoxPro and DOS FoxPro applications under Windows (always with a PIF), but I'm forever having trouble when I exit FoxPro. If I start Windows with no parameters, these applications hang when I exit, and I have to use Ctrl-Alt-Del twice to shut them down and return to Windows. Neither Alt-Tab nor Ctrl-Esc accomplish anything in this situation.

But if I start Windows using a /D:X parameter, everything works fine. What's going on? I have several Windows hints/tips books, and I can find no references to start-up parameters. I can't remember where I found this one, and

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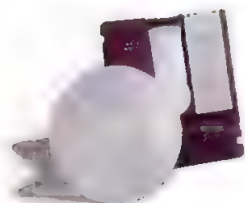
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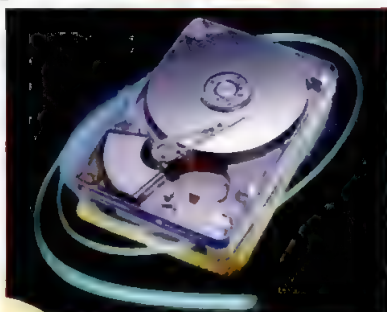


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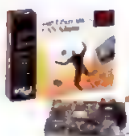
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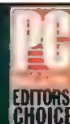
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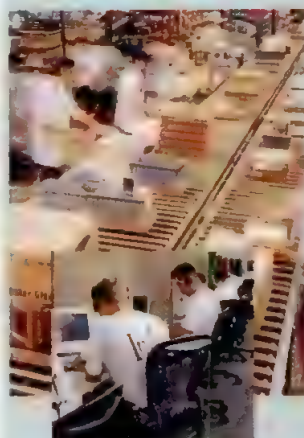
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I'd be interested in learning if there are any other helpful start-up parameters.

KEN MCCLELLAN
via the Internet

PC MAGAZINE: Yes, there are more start-up parameters. You can get a nice list of the ones for WIN.COM using the old DOS technique of adding /? to the command line. The /D:X switch you've been using excludes all of the adapter area from the memory Windows scans when it seeks unused space. Apparently one or more adapter cards on your system use memory in the range that Windows fails to perceive. The help supplied by WIN /? also describes an equivalent SYSTEM.INI key, so you won't have to use the /D:X switch every time.

This technique isn't restricted to Windows 3.x, either. The Windows 95 version of WIN.COM displays a similar list of start-up parameters when you run it with the /? switch. You can even run the command WIN /? at a DOS prompt or from the Run item on the Start menu.—Neil J. Rubenking

ONLINE

Using Dial-Up Networking to Connect To CompuServe



A growing number of Internet-related applications make special use of Windows 95 Dial-Up Networking. As a CompuServe user, I'm wondering if there is any way to set it up so that I can connect to the Internet using this service.

GEORGE MARANTZ
Patchogue, New York

PC MAGAZINE: You bet. The irony is that while Microsoft took a lot of heat when Windows 95 replaced CompuServe's Winsock Internet dialer with its own, Windows 95 provides (but doesn't document!) direct access to CompuServe via Dial-Up Networking (DUN), which can be set up quite easily. Windows NT Workstation 4.0 also provides a way, although the details are different. This solution is CompuServe-specific, though; I know of no way to set up Prodigy or America Online to support DUN.

The Dial-Up Networking folder contains the individual connection profiles (Microsoft calls them *connectoids*) that you set up for connecting to the various services with which you have accounts. If you use only the Make a New Connection wizard to enter your CompuServe telephone number and user ID, it assumes a standard request for the user ID and then the password when you try the connection. But CompuServe doesn't follow this

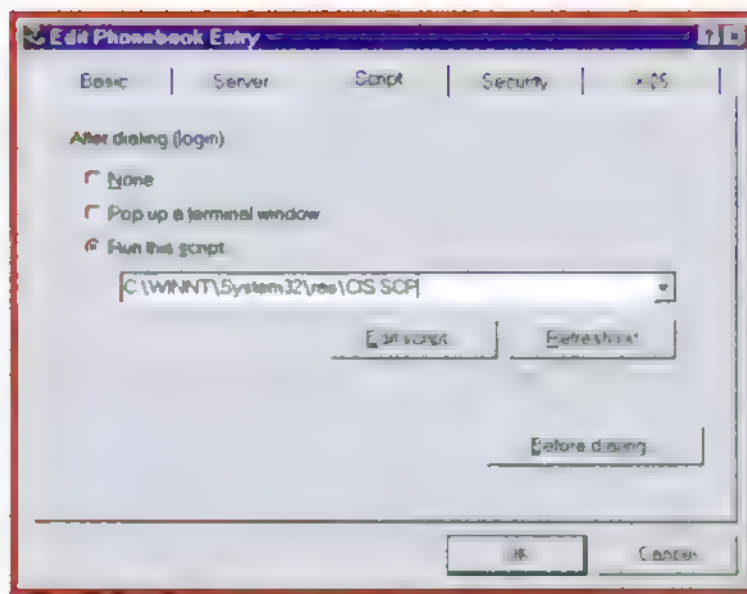


FIGURE 2: Windows NT 4.0 has scripting built into Dial-Up Networking.

standard. Instead of requesting a user ID first, CompuServe asks for the host, expecting you to type in "CIS" (short for CompuServe Information Service). To get a direct Internet connection, you must then add "/go:pppconnect" to your user ID. In addition, some older nodes require you to use 7E1 as your port parameters rather than the standard 8N1.

Luckily, you can handle these variations with a script, and you don't even need to learn the scripting language; an appropriate script is provided by Microsoft. Under Windows 95, there are four steps to follow:

- Install Dial-Up Scripting (DUS);
- Create a CompuServe DUN connectoid;
- Attach the right script to this connectoid;
- Set up the CompuServe DUN connectoid.

Check to see whether DUS is already installed on your system. The Microsoft Plus! pack, the Internet start-up kit, and many recent computers come with it. Look on the Start menu under Programs/Accessories for an entry called "Dial-Up Scripting Tool." If it isn't there and you have the Windows 95 CD-ROM, start up the Add/Remove Control Panel applet and click on the Windows Setup Tab. Then press the Have Disk button, browse to the \admin\apptools\dscript directory on the CD, and select RNAPLUS.INF. Hit OK twice, check "SLIP and Scripting for Dial-Up Networking," and hit Install. You can also download DUS from the Internet; go to www.microsoft.com/windows/software/admintools.htm and click on "Dial-Up SLIP and Scripting Support."

Once DUS is installed, go to My Computer, open the Dial-Up Networking folder, and click on Make New Connection. Fill in the telephone number of your CompuServe node and give the connection a name. Now run the Dial-Up Scripting tool. In the resulting dialog, choose the CompuServe connectoid you just created, hit the Browse button under the FileName entry, and choose cis.scp from the list of scripts.

The first time you run the connectoid (either from the Dial-Up Networking folder or by dragging a shortcut to your desktop),

you'll need to be careful to fill in your CompuServe user ID (Windows will have filled in your Windows user ID, which is almost surely not your CompuServe ID) and your password.

The procedure is similar under Windows NT 4.0, but there's no need to install DUS, since it is built in. When you click on Dial-Up Networking the first time, a wizard for making the connectoid will appear.

When you finish, you'll see a dialog containing a button marked More. Click the button to get a menu that includes "Edit Entry and Modem Properties." Pick that and the resulting dialog will have a Tab called Script (see Figure 2). The drop-down list will display the available scripts, including cis.scp.

If you have other Internet service providers with specialized connections, scripting will often help, but you may need to write your own. Your best bet is to try modifying an existing script; the script language is documented in the Dial-Up Scripting tool's Help or in the Windows NT 4.0 file \winnt\system32\ras\script.doc.

—Barry Simon, contributing editor

WORD PROCESSING

Multiple References To a Footnote in Microsoft Word



Microsoft Word lets you add endnotes and footnotes to your document and automatically numbers the notes. Occasionally, however, I need to cite a reference more than once, so the numbering in the text might run 1, 2, 2, 3, 1, 4, say, instead of 1, 2, 3, 4, and so on. Is there any way to do this automatically in Word, instead of having to add the numbers manually?

YONG HUANG
via the Internet

PC MAGAZINE: This feature is built into Word, but you won't find it by choosing Insert | Footnote. Word considers additional references to a footnote or an endnote to be cross-references. The procedure for adding these cross-references is the same for both footnotes and endnotes; for clarity, I'll refer only to footnotes.

To enter a reference to an already existing footnote, first place your cursor where you want the reference mark added. Then choose Insert | Cross-reference to open the Cross-reference dialog box. Choose Footnote in the Reference Type list box and Footnote Number in the Insert Reference To box, then highlight the appropriate footnote in the For Which Footnote box and choose Insert to add the reference.

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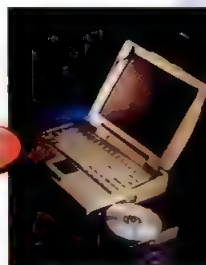
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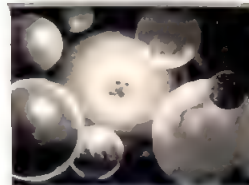
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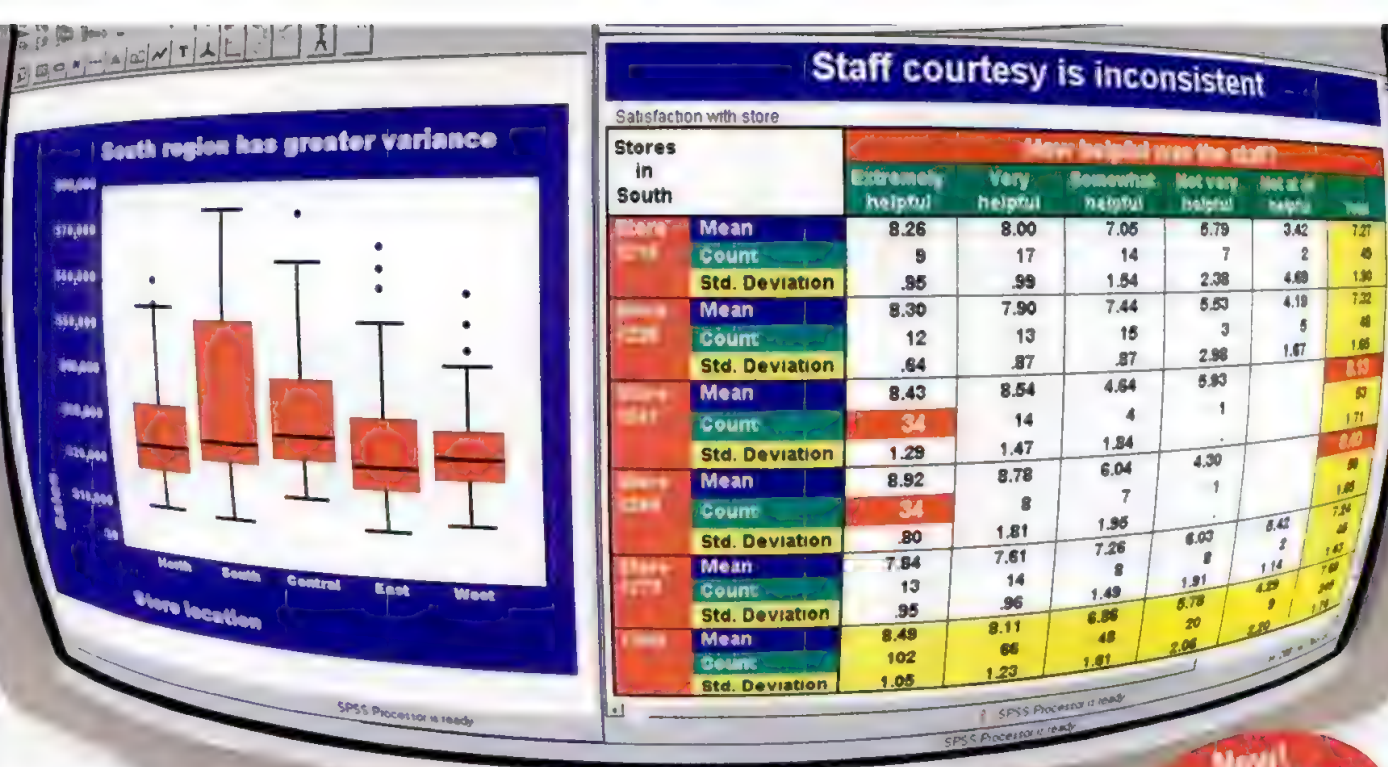
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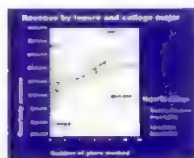
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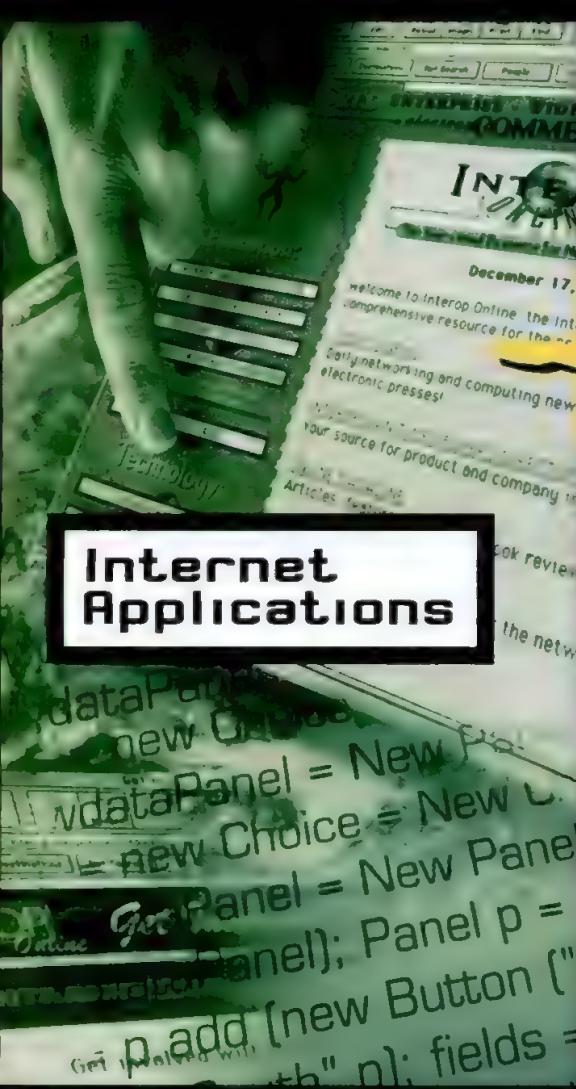
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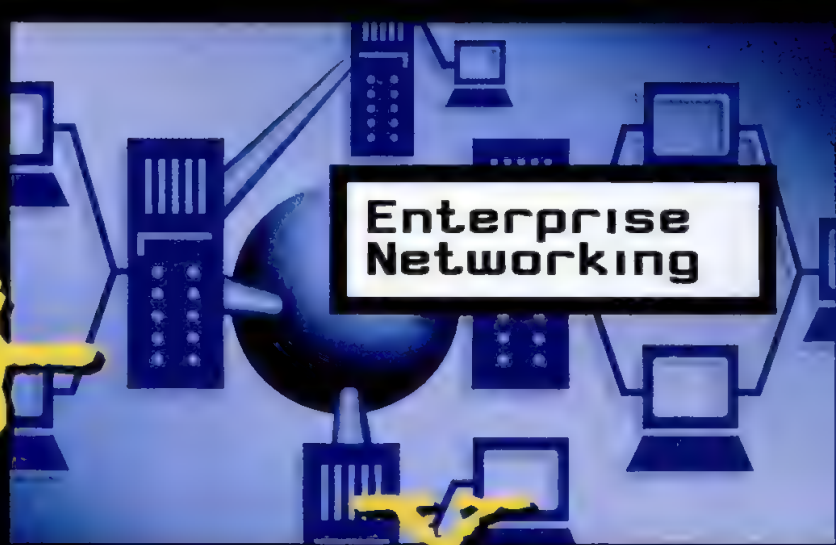
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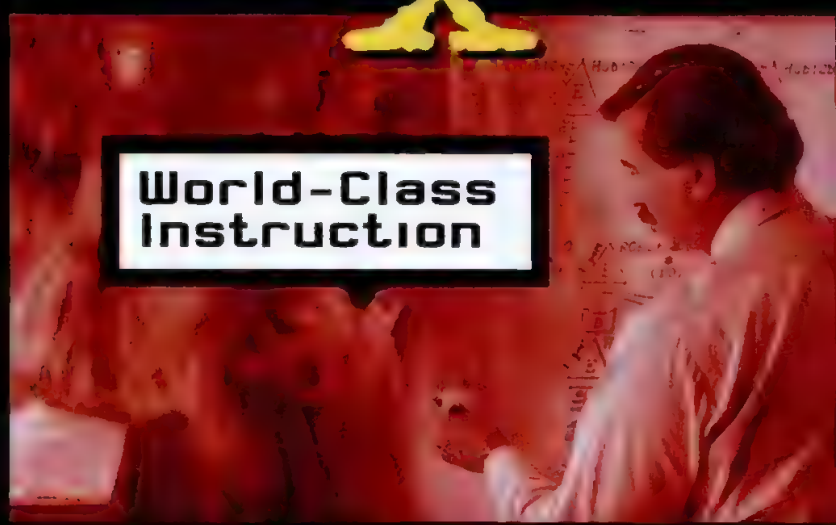
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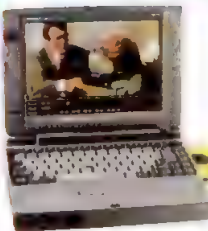
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Model	CPU	Screen	RAM	CD-ROM	Price
500CS	120MHz	12.1" Dual Scan	16MB/1.3GB	Opt.	\$2199
510CDS	133MHz	12.1" Dual Scan	16MB/1.2GB	10X	3699
500CDT	120MHz	12.1" Active	16MB/1.3GB	6X	4167
510CDT	133MHz	12.1" Active	16MB/2.1GB	10X	4999



Tecra 510

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LifeBook™ 500Notebook

- Up to 150MHz Pentium processors
- Built-in 6X CD-ROM drives
- Up to 12.1" displays
- 28.8Kbps modem on selected models

Model	CPU	Screen	RAM	CD-ROM	Price
520D	120MHz	11.3" Dual Scan	8/810MB	6X	\$1999
520T	120MHz	11.3" Active	8/810MB	6X	2799
530T	133MHz	11.3" Active	16MB/1.3GB	6X	3499*
555T	150MHz	11.3" Active	16MB/1.3GB	6X	4399*

* Includes built-in 28.8Kbps modem

LifeBook™ 520D
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Up to 150MHz Processors



LifeBook™ 500 Notebook

LifeBook™ 600 Notebook

- 133MHz Pentium processors
- Only 1.2" thick and 4.2 lbs
- 12.1" Active Matrix displays
- Integrated 28.8Kbps modem

Model	CPU	Screen	RAM	CD-ROM	Price
635T	133MHz	12.1" Active	16MB/1.3GB	Opt.	\$3999
635T	133MHz	12.1" Active	16MB/1.3GB	Opt.	3999*

* Includes Windows for Workgroups or Windows 95

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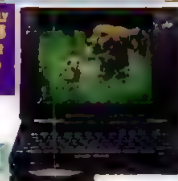
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- Up to 150MHz Pentium processors
- Built-in CD-ROM drives on 760E
- 16-bit SoundBlaster compatible audio
- Built-in 28.8Kbps modems on selected models
- 11.5" and 12.1" Super VGA displays

Model	CPU	Screen	RAM	CD-ROM	Price
760EL	100MHz	11.3" Dual Scan	8/810MB	Opt.	\$3399
760ED	133MHz	12.1" Active	16MB/1.2GB	4X	5399
760E	150MHz	12.1" Active	16MB/2.1GB	Opt.	5699
760ED	133MHz	12.1" Active	16MB/2.1GB	6X	5999

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- Infrared port for wireless communications
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Model	CPU	Screen	RAM	CD-ROM	Price
365XD	100MHz	10.4" Dual Scan	8/810MB	4X	\$1999
365X	120MHz	10.4" Active	8/810MB	Opt.	2299
365XD	120MHz	10.4" Active	8/810MB	4X	2499
365XD	133MHz	11.3" Active	8MB/1.4GB	6X	3499

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Presario

Presario 1020
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5-Year TAP Warranty... \$399.97

LTE 5000

Model	CPU	Screen	RAM	CD-ROM	Price
5250	120MHz	10.4" Active	16/810MB	Opt.	\$3099
5280	120MHz	11.3" Active	16MB/1.35GB	Opt.	3859
5300	133MHz	12.1" Active	16MB/1.35GB	Opt.	4349
5380	133MHz	12.1" Active	16MB/2.2GB	Opt.	5439
5400	150MHz	12.1" Active	32MB/2.2GB	Opt.	5539

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9080	133MHz	12.1" Active	16MB/1.3GB	6X	\$2799

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WideNote

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W100D	133MHz	11.2" Wide Dual Scan	16MB/1.1GB	Opt.	\$2799
W100T	133MHz	11.2" SHA Wide Active	16MB/1.1GB	Opt.	\$3299

W100D
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NEC Versa 6200MX

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- 13.3" Active Matrix display
- 10X CD-ROM drive
- 64-bit PCI bus architecture

Model	CPU	Screen	RAM/HD	CD	Price
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NEC Versa 6200



NEC Versa 2600

NEC Versa 2600

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- Fullscreen MPEG video support

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2655CD	150MMX	12.1" Dual Scan	16MB/1.4GB	10X	CALL
2655CDT	150MMX	12.1" Active	16MB/1.4GB	10X	CALL

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MMX166T	166MMX	12.1" Active	16MB/2.1GB	8X	\$1999

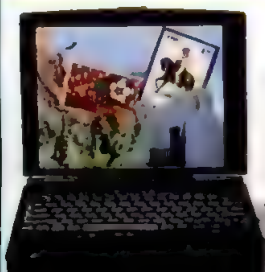
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Hitachi Mx™
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\$1819

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Extensa 600CD

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- PCMCIA 28.8 fax/modem
- 2MB video memory

Model	CPU	Screen	RAM/HD	CD	Price
6020	120MHz	11.3" Active	8MB/1.08GB	Opt.	\$2739
6030	133MHz	12.1" Active	16MB/1.35GB	Opt.	3399
6050	150MHz	12.1" Active	16MB/1.35GB	Opt.	3699

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VP 500	120MHz	11.3" Dual Scan	8MB/1.0GB	6X	2449
VP 500	120MHz	11.3" Active	8MB/1.0GB	6X	2949
VP 500	133MHz	12.1" Active	8MB/1.44GB	6X	3599

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Ultra II	133MHz	11.3" Active	16MB/1.35GB	Opt	\$4499
Ultra II	150MHz	11.3" Active	16MB/1.44GB	Opt	4659*
Ultra II	133MHz	11.3" Active	16MB/1.35GB	Opt	4699**
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A41	120MHz	11.3" Dual Scan	16MB/1.0GB	6X	\$2199
A42	120MHz	12.1" Active	16MB/1.0GB	6X	2799
P50	133MHz	12.1" Active	24MB/1.0GB	4X	3699*
P50	133MHz	12.1" Active	24MB/2.1GB	4X	4299*

* Features 28.8 fax modem

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800CT	133MHz	10.4" Active	16MB/1.4GB	Opt	4279

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5500CTS	120MHz	10.4" Active	16MB/1.35GB	Opt	\$3129
5500CTS	133MHz	12.1" Active	16MB/1.35GB	Opt	4029
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4712	166MHz	24MB/2.5GB	8X	1899
4716	200MHz	32MB/2.5GB	8X	2199
4764	166MMX	24MB/2.5GB	16X	1899
4770	200MMX	32MB/3.8GB	16X	2299

Presario Monitors

Model	Size	Resolution	Price
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Presario 15"	15"	13.5"	479
Presario 17"	17"	15.6"	749

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7360	200MHz MMX	32MB/3.8GB	16X	2499

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7200	200MHz	16MB/3.0GB	8X	2199

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9404	200MHz MMX	16MB/2.0GB	8X	1999

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field results, the cross-reference will show as a reference mark (for example, as a footnote number), using the same numbering scheme and number as the footnote to which you're referring. If Word is set to show field codes, the cross-reference will show as a NOTEREF field and will take the form {NOTEREF _RefNNNNNNNNN}, where the Ns represent numbers. To toggle between showing field results and field codes, you can return to the document, as I'll explain in a moment, and use Alt-F9, or choose Tools | Options, then View, and add or remove the check from the Field Codes check box.

When you add a cross-reference, the dialog box will stay open so that you can add more cross-references if you need to. You can move back and forth between the document and the dialog box with Ctrl-Tab or by clicking on the document or dialog box as appropriate. Simply place the cursor where you want the next cross-reference, then move back to the dialog box to insert it. When you're done, choose Close to close the dialog box.

You need to be aware of a few issues to take the best advantage of this feature. The first thing you'll notice when you insert a cross-reference this way is that Word does not automatically use the same format for cross-references as it does for footnote reference marks. By default (meaning, unless you've changed the style definition for the Footnote Reference style), footnote reference marks are superscripted and in a smaller font size than the surrounding text. The inserted cross-references, however, are formatted to match the surrounding text. If you like, you can select each cross-reference and reformat it, but there's a better approach.

To tell Word to format a cross-reference to match the original footnote reference mark, you only need add the \F switch to the field. Use Alt-F9 to toggle Word to show the field codes, then add the switch so the field takes the form {NOTEREF _RefNNNNNNNNN \F}. Then, with the cursor still in the field, press F9 to update the field. When you toggle Word back with Alt-F9 to show field results, the format for cross-references will match the original footnote reference marks.

Be aware also that when you add or delete footnotes, Word will immediately renumber any later footnotes, but not the cross-references. To change the cross-reference numbers, you'll have to update the fields.

If you don't need the cross-references updated while you're editing the file, you can let Word handle the update automatically at print time. (And note that both Word 6.0 and Word 7.0 will update the NOTEREF fields at print time even if the print options aren't set to update fields.) If you need to see updated cross-references while you work, you can choose File | Print Preview, which will also update the fields. Then close the preview window to

return to editing.

Finally, note that if you delete a footnote that you've cross-referenced, you will need to find and delete the original cross-reference. When you update the field, Word will insert the bold-face message, "Error! Bookmark not defined." Unfortunately, it will print the message as well. But since such messages are in boldface, you can easily scan through your file to find and delete them.

Alternatively, you can search for fields to make sure you haven't overlooked any. After you update the fields, choose Edit | Find, and enter ^d (a caret followed by a lowercase d) as the item to search for. This is the special character for finding any field. Do not tell Word to search for the bold format. Even though the error message shows in bold, the field itself is not in bold as far as the Edit | Find command is concerned. Word will find each field and let you decide whether to delete it.—M. David Stone

DATABASES

Converting Access 95 Tables to Access 2.0 Format

 There's no "Save As Access 2" option in Microsoft Access for Windows 95, so what do you do when you want to give a table to someone who only has Microsoft Access 2.0? I found a simple solution: To save the table in Access 2.0 format, you export the table by selecting the File menu, choosing SaveAs/Export, and then choosing an existing Access 2.0 database. Access for Windows 95 automatically handles the data conversion to Access 2.0 format.

BEREL LEVERTOV
via the Internet

PC MAGAZINE: This is an important though less-than-obvious feature for those of us who work with both old and new versions of Access. If you frequently perform this table export, you could automate the procedure using Access's TransferDatabase macro action or TransferDatabase VBA method. For example, let's say you want to export an Access 95 table called Customers to an Access 2.0 database on a regular basis. To create a macro, select the

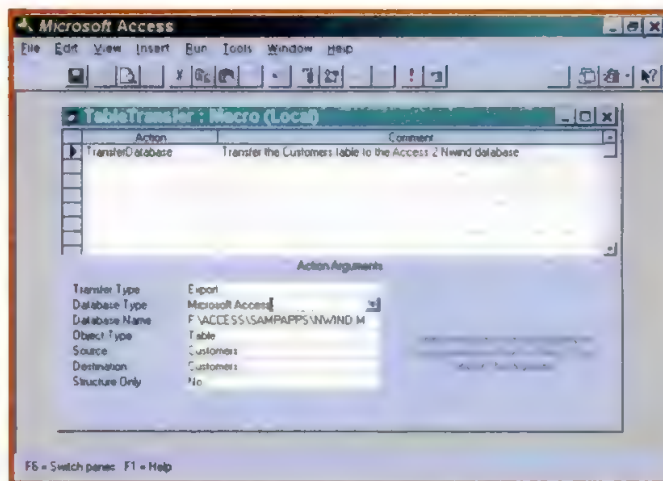


FIGURE 3: You can save an Access 95 table to an Access 2.0 database by exporting it, and you can automate the procedure using the TransferDatabase macro action as shown here.

Macros tab, click New, and then choose the TransferDatabase action. In the Action Arguments section, set Transfer Type to Export, Database Type to Microsoft Access, and Database Name to the fully qualified name of the Access 2.0 database to which you want to export the table (for example, F:\ACCESS\SAMPAPPS\NWIND.MDB). Set Object Type to Table, Source to the name of the table you want to export (say, Customers), Destination to the name for the table in the destination database (perhaps the same, Customers), and leave Structure Only as No (see Figure 3). Next, you can choose File | Save As and give the macro a name like TableTransfer. Now whenever you want to export the table, you can run the TableTransfer macro by choosing the Macros tab, selecting the TableTransfer macro, and clicking Run.—Sal Ricciardi

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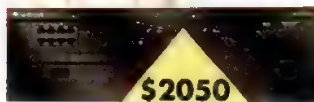


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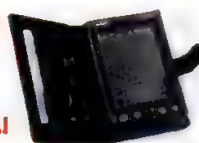
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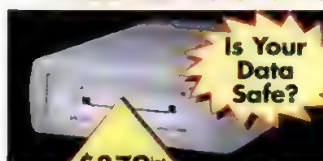
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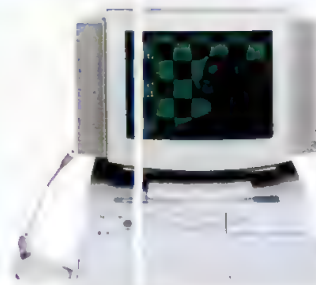
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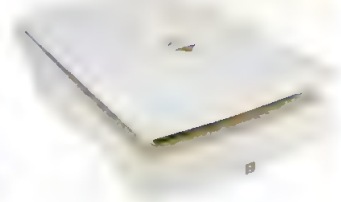
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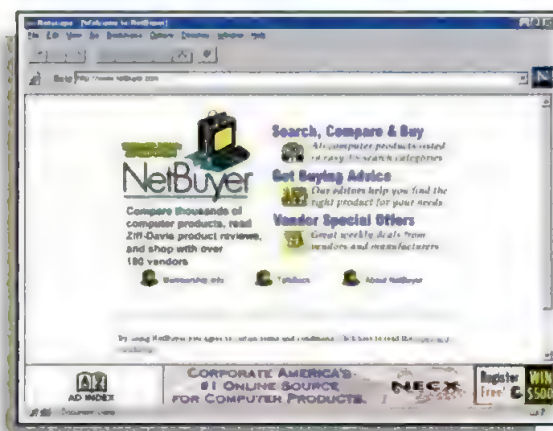
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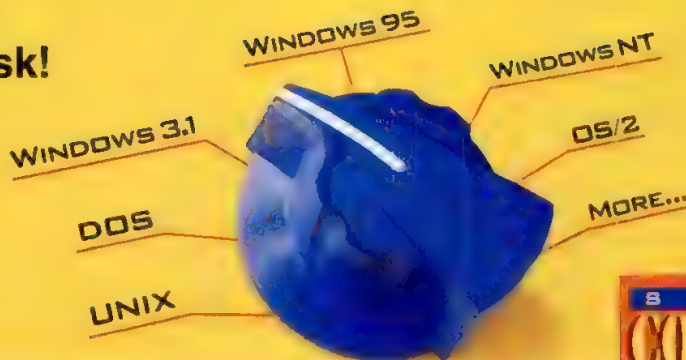
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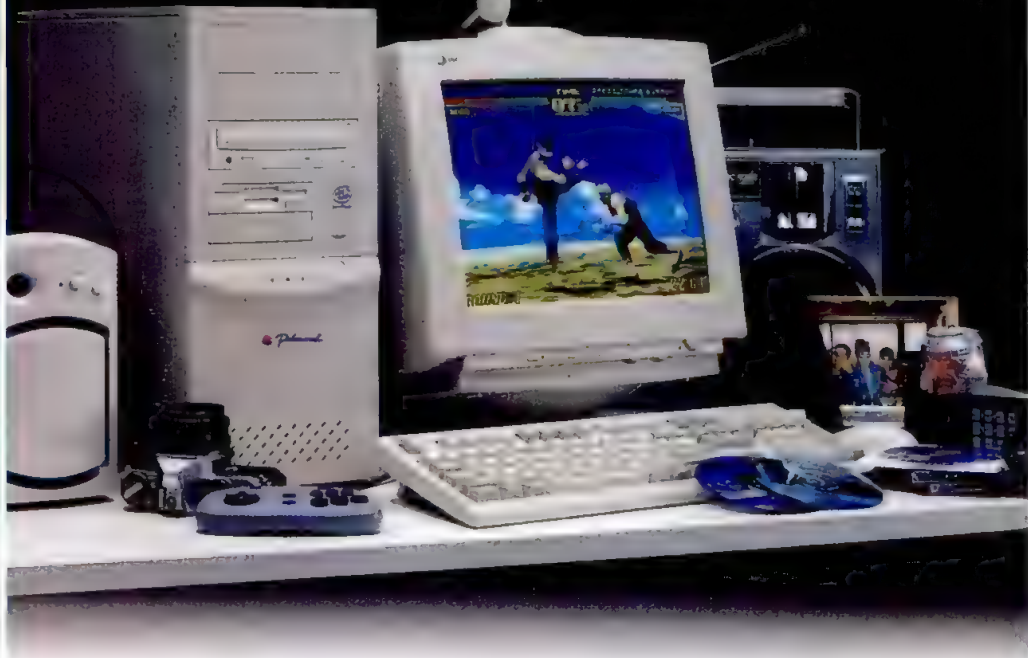
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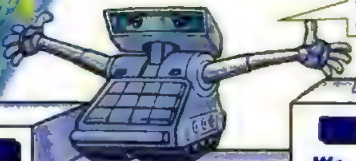
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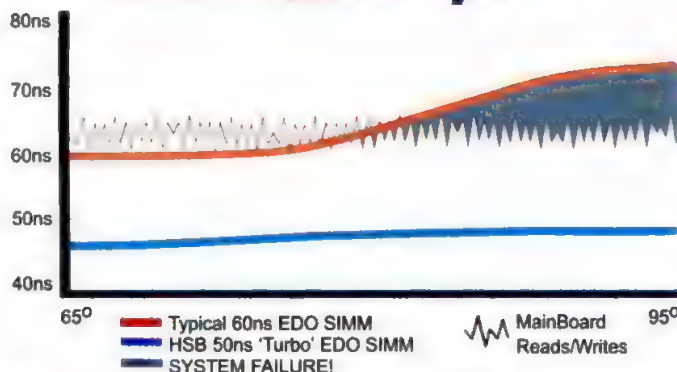
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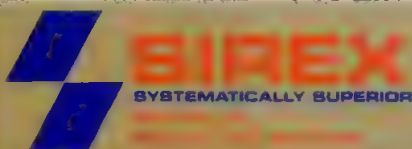
HP-D4131A	Vectra 515CD 5/100	1215	44 LB	HP-D4174A	Vectra 515 MCx 5/150 SBC	2129	44 LB
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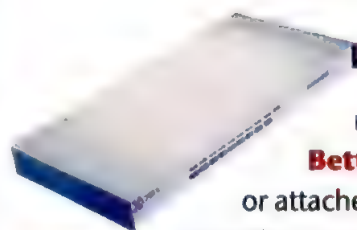
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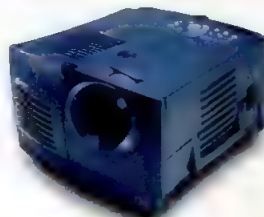
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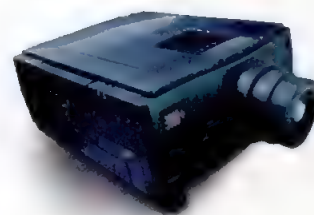
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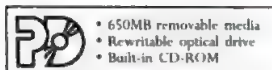
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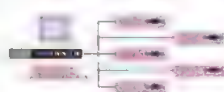
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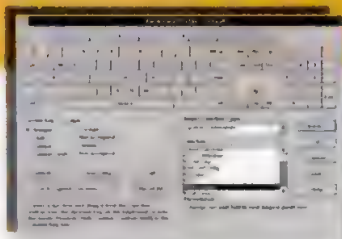
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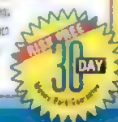
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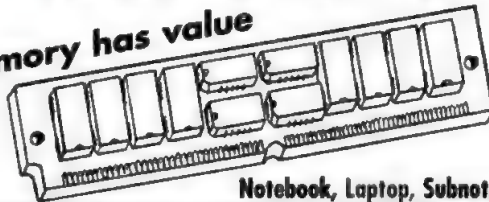
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16MB 75	76	4MB 23	23
32MB 149	152	8MB 34	36
64MB 389			

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EDO 3.3 Volt		Dell / Intel	
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Epson AI 1100, 1400, 1600	45	79	109	225	
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HP II ID	68	98			
HP 35, 4, 4M, 4S	48	58	98		
HP 1200C, DJ200-750	58	98	198	398	
HP 4MP-4P, 4A, 4M, 4V	38	38	78	148	338
HP 4MP-5MP, 5P, 5S, 5J	38	38	78	148	338
HP 4L	34				
HP D, 500 Series, 1250K	32				
HP 5L	49	69	119		
Panasonic 4410, 4430	84	144			
Panasonic 4420, 4450	84	144			
TI Microcenter 1MEG 548			128		

Video Memory

	80ns	70ns	60ns
256x4 Drip	5	6	7
256x16 SOJ		19	19
256x16 ZPP Cas		39	
256x16 SOJ, EDO			37
256x8 SOJ		19	19

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Cache Memory

	25ns	20ns	15ns	12ns
8Kx8	4	5	6	19
32Kx8	5	6	7	12
32Kx8 3.3v		9	13	
32Kx8 SOJ		11	15	
64Kx1	7	8	9	
64Kx4	7	8	9	
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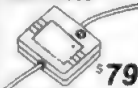
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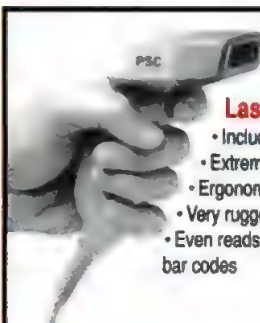
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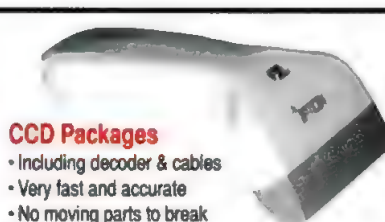
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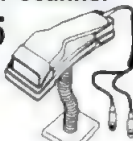
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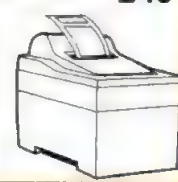
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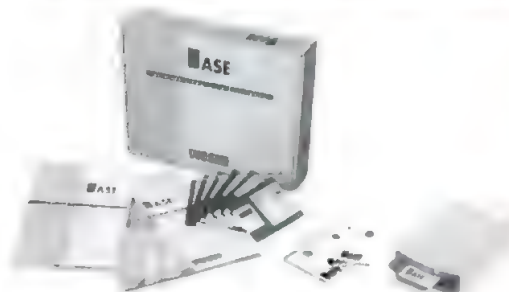
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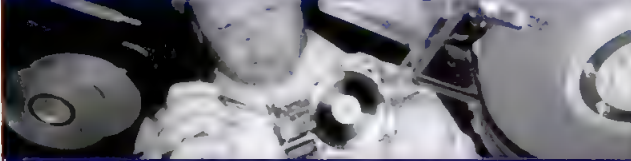
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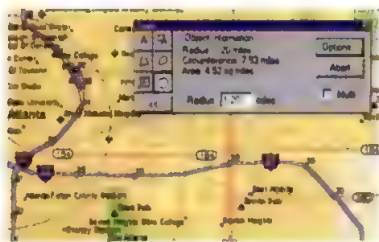
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[*DICTIONARY OF THE FUTURE, PAGE 531*]

lost (lôst) *adj.* [archaic]

1. unable to locate one's position, as in, "Help. I am lost."

2. having no sense of direction at all

n.b. became obsolete in 1996 with the introduction of Street Atlas USA 4.0 and Tripmate.

At Home

A SPECIAL REPORT ON PRODUCTS FOR THE PERSONAL SIDE OF COMPUTING

Taxation Without



FRUSTRATION

By Kathy Yakal



Chances are, if you could hire a whole team of lawyers and accountants to prepare your tax return for less than \$50, you'd jump at the opportunity, right? In essence, that's what you'll get when you exchange some of your hard-earned dollars for one of the tax-preparation software packages we review here. Each of the four Windows-based products in this roundup incorporates the expertise of the many professionals who contributed to their content and design.

This year, we reviewed the three perennial heavyweights: Block Financial Corp.'s Kiplinger TaxCut (\$39.95), Parsons Technology's Personal Tax Edge Deluxe (\$29), and Intuit's TurboTax Deluxe (\$49.95). Of the three, only Parsons offers upgrade pricing for users of previous versions (\$16). We also reviewed a newcomer to the market, Total Peripherals' U.S. Tax (\$19.95). Unfortunately, we were unable to get hold of Simply Tax, formerly published by 4Home Productions, for testing. It is now being retooled for the 1996 tax year by CD Titles (800-345-6665).

As usual, in order to complete this story in time for tax season, we looked at early and prerelease versions

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of the packages. For this reason, there is a possibility that the final version of any package reviewed here may have bugs, calculating errors, and other problems that weren't present during our tests. We advise you to check each vendor's Web site as well as ours (www.pcmag.com) for updates, notifications of bugs, and other information.

WHAT, ME WORRY?

If you're already using a tax professional or service to prepare your return, you may feel that it's best to stay that course. But if you're still doing all this preparation on your own—armed with pencil, paper, and calculator—or if you simply have doubts about whether you need to pay someone else for your tax preparation, you'll find a lot of reasons to consider using tax software. For one thing, these programs eliminate the need to enter and reenter bits of data, such as your social security number or gross annual income, because they accept that information once and then place it wherever needed on your return. This can save

time and prevent transposition errors. And they offer a painless data-entry option that asks you simple questions and inserts your answers in the appropriate places without sub-

jecting you to all of the 1040's wondrous intricacies.

And if you're looking for advice, you'll certainly find it in these packages. Behind the scenes, each package inter-

prets tax laws and unscrambles IRS code so that the right data goes on the right lines.

But sometimes you need a bit more information before you can provide the right figure for a given line. Numerous guidance systems help you through this, offering interpretations of tax law in addition to the standard, cryptic instructions provided by the Internal Revenue Service. Helpful documents and brief videos can round out the process.

And when you've entered the final bit of data, these programs review your work and point out possible errors and omissions that they haven't already flagged along the way, including simple data-entry problems and entries that might raise an eyebrow at the IRS. Some programs go further, offering planning aids for next year to minimize future tax obligations.

We ran these products through many of the paces that users with both complex and simple income/expense scenarios would do. Happily, we found enough enhancements and new functionality in their interfaces, tax processing capabilities, and help systems to please longtime users—and to give new users even more reason to consider hiring such a team of tax experts this year.

Ten Reasons to Use Tax-Preparation Software

- 1 It can really help you find ways (often minor, but occasionally significant) to trim your tax bill.
- 2 The better programs are peppered throughout with expert advice. It's unobtrusive but readily at hand if you need it.
- 3 Tax software companies will take responsibility for any penalties incurred by calculation errors (which are rare).
- 4 If you track your finances in a personal finance program, tax software can plug in all of the numbers quickly.
- 5 Guidance is available in an engaging multimedia format, so you can see and hear real people explaining tax law.
- 6 Tax software not only helps you prepare this year's return but helps you start preparing now for next year's.
- 7 No transposition errors, no calculation mistakes, no getting your return back from the IRS because of a simple mistake.
- 8 No dealing with IRS language unless you want to. Tax preparation programs speak English.
- 9 You're quite likely to spend less time preparing your return when you use tax software.
- 10 Tax software gives you a central focus for your tax-preparation hours, creating a sense of orderliness.

REPORT CARDS

Reading the Report Card

We graded each of these four packages for both power and ease of use in three categories. We used the following grades: A, excellent; B, above average; C, average; D, below average; E, failing.

An average rating for **preparation** indicates that the product included an adequate number of forms and schedules and automatically linked data fields between them. Higher scores were given to products that imported .TXF files and offered multiple data-entry options. Top marks were given to programs that went a step further by keeping everything intuitive.

A good score for **guidance** indicates that easily understood information on tax law is not only available but

abundant. The best programs also offer tax tips, along with video clips and text files that help illustrate a point rather than show off your PC's multimedia capabilities.

For **audit/review**, we evaluated the ways in which each product allows you to generate "what if" scenarios to see how your tax situation might change as your financial situation changes. Products that scored well here let you compare the results of filing your return separately against the effect of doing so jointly with your spouse. Top-rated programs also allow you to audit and review your completed return, checking for errors, omissions, or possible missed deductions.

REPORT CARD

Product Name

	Power	Ease
Preparation	A	A
Guidance	B	B
Audit/review	C	C

Block Financial Corp.

Kiplinger TaxCut

Kiplinger TaxCut has enjoyed a long history as one of the most respected and reliable tax-preparation programs available. Thanks to improvements this year, the product's reputation remains intact. TaxCut now offers a slightly altered interface, the return of the 1040PC as a filing option, a custom-tailored interview process,

and an enhanced help system. Its enhancements do not add up to the powerhouse level of TurboTax Deluxe, but they certainly maintain TaxCut as a solid contender.

If you used TaxCut last year, you can import those numbers into this year's tax return. Either make your changes right away or alter the necessary fields as the program leads you through them. You can also import data files exported from another program in .TXF format.

One feature that new users will especially appreciate is that TaxCut lets users enter data in its new, somewhat unusual interview process. Instead of asking you the same set of questions it asks every user, TaxCut asks you several questions about the types of income and expenses you had over the last year, then tailors the path of the interview to cover only those topics that apply to you.

That aside, the Q&A section (TaxCut's name for the interview process) operates much as it has in the past. Questions are displayed in the screen's upper window, and the appropriate tax form appears in the lower window. As you answer queries, your data appear on the appropriate line on the form. Click on the Whole Form button and the entire form appears on screen. Another button click brings you back to the Q&A split screen. Transitional screens display a brief summary of your return so far. Context-sensitive program

Editors' Choice

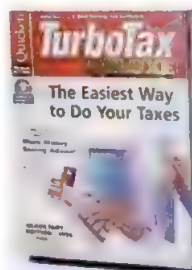
• TurboTax Deluxe



As always, the tax-preparation software category is a capable

one, but, just as last year, only one product emerged as the clear winner. Although Turbo-

Tax Deluxe and Kiplinger TaxCut handled most of our test scripts equally well, TaxCut's audit and review features simply could not match the thoroughness shown by TurboTax Deluxe's feedback. TurboTax Deluxe prevails in other areas too, such as its centralized help system and its economical use of screen space.



help, verbatim IRS instructions, and Kiplinger Tax Tips should leave you with little or no confusion about a given entry. Clicking the Rapid Find button lets you search for information and the appropriate forms for topics

such as bad loans, farm depreciation, and health insurance for the self-employed.

If you prefer to work directly on the IRS forms and schedules, you can still access the product's help information quickly and easily. A small question-mark icon follows you from line to line. Click on it and you can view context-sensitive Kiplinger tips and IRS instructions, make a detail list or use the calculator, and jump to related forms or revisit forms you've already used in the current session.

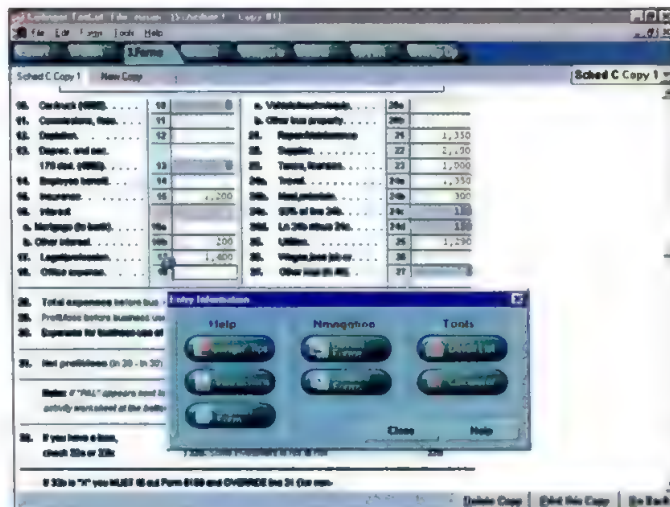
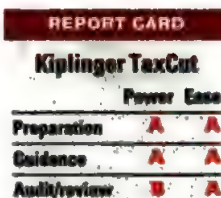
Intuit has polished the program's already elegant interface even more, providing TurboTax Deluxe with one of the best-looking, most functional interfaces of any PC application available today. And the quality of TurboTax's internal workings matches the excellence of its screen displays. The program exchanges existing data with Quicken well, yet it easily accommodates users starting from scratch with paper documents and receipts. And although we would like to see every tax program improve its error trapping, TurboTax's review process gets a little more helpful every year.

Every step of the way, TurboTax Deluxe helps you build the most accurate return possible, with an eye toward minimizing your tax obligation this year and in the future. So this year again, TurboTax Deluxe stands alone as our Editors' Choice.

A good tax program helps you both avoid errors and find possible deductions during the process of preparing the return. TaxCut does this

and suggests tax-saving opportunities.

If you're also using a TaxCut state module, the program will carry the pertinent data



Kiplinger TaxCut's Entry Information box puts guidance, navigational tips, and related tax help within easy reach.

well and offers a number of postpreparation review tools to help you double-check your 1040 form for errors and omissions. The TaxCut Auditor nails down inconsistencies or missing data. It also evaluates your financial scenario

over from your federal 1040.

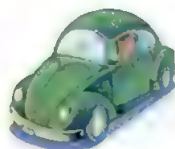
And if you need to file returns in more than one state, you can buy one CD-ROM from Block Financial that contains the 23 most requested state editions for the same price as one individual state

Our Contributors: KATHY YAKAL, a freelance author specializing in financial software, is a frequent contributor to *PC Magazine*. MICHAEL E. RYAN was the associate editor in charge of this story.

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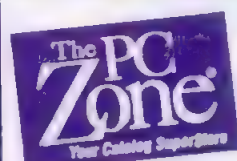
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Kiplinger TaxCut has not quite caught up with TurboTax Deluxe (the difference between them remains slim), but its combination of reliable tax advice, a usable interface, and solid preparation tools makes it a highly creditable alternative to the market leader. **Kiplinger TaxCut.** List price: \$39.95. Block Financial Corp., Kansas City, MO; 800-235-4060; fax, 913-438-3749; www.conductor.com. *Circle 441 on reader service card.*

Personal Tax Edge Deluxe

Personal Tax Edge Deluxe imports financial data stored in Parsons' Personal Tax Organizer, software you can use year-round to track tax-relat-

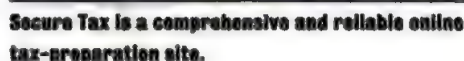


As always, Personal Tax Edge Deluxe asks you early on whether you want to use its in-

terview process or direct data entry on forms. If you choose the latter, you'll have several tools available at every line, including a notepad, a book-keeper for itemizing totals, and a window listing every other line in your return that

Secure Tax incorporates enough

There are lots of similar Web sites. You can find many of them by running a quick search through one of the major Internet search engines.—KY



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AT HOME

Tax-Preparation Software

affects or is affected by the current line.

The interview option operates much the same as in previous versions. Questions appear in a window at the top of the screen, while the related form or schedule appears below. You're allowed to enter data in fields related to that question but are locked out of ones that will be handled later. Flip the switch on the new Line-by-Line Assistance tool and Personal Tax Edge Deluxe gives you a bit more particular information.

As in direct data entry, you have access to a notepad and bookkeeper during the interview. And you can toggle the audio and video switches to enable multimedia assistance along the way. Transitional screens between topics ask broader questions to help move you in the right direction. They also offer access to a running summary of your tax obligation.

Personal Tax Edge Deluxe's help system offers guidance in terms of program operation and understanding the IRS tax code. Click on the Help button and a box pops open to display a list of available resources, including the full text from the *J.T. Lasser Tax Guide*, commonly asked questions, an IRS instruction booklet, and tax tips for individual lines and forms. A basic version, identical to the deluxe version except that it does not include the Lasser guide and some other references, is available for \$19.

A three-part audit feature helps you review your work and correct any errors you may have made. Personal Tax Edge Deluxe also shows you a summary of the most impor-

SUMMARY OF FEATURES

Tax-Preparation Software



■ YES ■ NO

Products listed in alphabetical order

General Features

	Kiplinger TaxCut	Personal Tax Edge Deluxe	TurboTax Deluxe	U.S. Tax
List price	\$39.95	\$29.00	\$49.95	\$19.95
Windows 3.1/Windows 95 native versions	■	■	■	■
Professional version available	■	■	■	■

Software Features

Interview option	■	■	■	■
Shoobox organizer option	■	■	■	■
File-import formats supported	.TXF	ASCII, .TXF	.TXF	None

Tax Help

Provides verbatim IRS instructions and interpretations	■	■	■	■
Provides tax-saving and tax-planning tips	■	■	■	■
Offers expert advice	■	■	■	■
Looks for errors and omissions/audit situations	■	■	■	■
Checks for unclaimed deductions during review	■	■	■	■

Forms Preparation

Number of forms, schedules, and worksheets	More than 100	84	More than 100	32
State versions available	AZ, CA, CO, CT, DC, FL, GA, IL, IN, MA, MD, MI, MN, MO, MS, NC, NJ, NY, OH, OR, PA, TN, VA, WI	DC and all states except AK, FL, NV, SD, TN, TX, WA, WY	DC and all states except AK, NV, TX, SD, WA	CA, GA, MA, MD, NY, PA
Cost per state version	\$24.95	\$19.00	\$24.95	Included

Filing

Prints IRS forms	■	■	■	■
Supports 1040PC format	■	■	■	■
Supports electronic filing	■	■	■	■
Fee for electronic filing	\$9.95	\$10.00	\$9.95	N/A

N/A—Not applicable: The product does not have this feature.

tant calculated figures in your return, displays a highlighted list of completed forms and schedules, and combs your return for entries or missing data that might cause problems with the IRS.

The program's post-preparation guidance can help you prepare for a better financial

future. For example, its Tax Savers feature suggests actions you can take to minimize future tax liabilities.

Although Personal Tax Edge

Deluxe has always done a good job of simplifying state taxes as much as possible, this year's software makes it even easier. You can load your state module directly into the federal 1040 program, rather than running a separate program, and then use similar tools to complete the

additional information that's required. Also, the program will link to the Internet (using your existing ISP account and Web browser) to access Parsons Technology's tax-related Web pages, as well as other related sites on the Web.

As always, you can print out your completed return in IRS-approved format, file electronically, or print the abbreviated 1040PC.

Personal Tax Edge Deluxe is a functionally reliable, trustworthy program. It falls behind its perennial competitors, TurboTax Deluxe and TaxCut, in many areas, but it's less than half the price.

Personal Tax Edge Deluxe. List price: \$29. Parsons Technology Inc., Hiawatha, IA; 800-223-6925; 319-395-9626; fax, 319-395-7449; www.parsonstech.com. **Circle 442 on reader service card.**

Intuit Inc.

TurboTax Deluxe



Competing with Kiplinger TaxCut for top honors is no walk in the park, but Intuit again has edged out its most formidable competition with this year's new, improved TurboTax Deluxe. Working from last year's top-notch version, Intuit zeroed in on the few areas in which TurboTax needed improvement (the interface, the interview process, and the final audit and review process), making many important changes. Additionally, TurboTax (\$49.95) now sports an expanded, centralized help system, a restructured data-entry system, and some new features that help you track

REPORT CARD		
Personal Tax Edge Deluxe		
	Power	Ease
Preparation	B	B
Guidance	B	B
Audit/review	B	A

Tax Support on Other Platforms

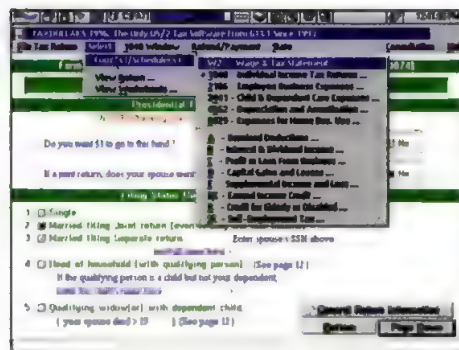
We focused on the four main Windows tax preparation packages here but also looked at applications for DOS and OS/2, as well as at a spreadsheet-based tax tool.

DOS-based tax programs have become pretty scarce, but at least one veteran remains. AM Software's AM-TAX (\$39, 800-859-8537, www.amtax.com) has long been a trustworthy DOS-based application, and it's back for the 1996 tax season. Although it offers few frills, it provides a reliable framework for your taxable income and deductible expenses. You can enter data in the program's 70-plus forms, schedules, and worksheets, and AM-TAX will carry data to wherever necessary and calculate the return. Then you either print your return or (for \$19 extra) electronically file it.

OS/2 users may want to consider BT&T Consumer Technology's TaxDollars (\$9.95 plus \$5.00 for shipping and handling, 800-672-8293, www.electricti.com/bttech). It provides fewer forms and schedules than most other tax programs (it includes the 1040, W2, 2106, 4562, 8829, 1099-

INT, and 1099-DIV, and Schedules A, B, C, D, E, EIC, R, and SE), but the graphical interface automatically links related documents, and the program performs all of the necessary calculations. The automatic calculation feature keeps a running tally for you on the main screen. And TaxDollars lets you view your tax-related financial information in a variety of formats, such as bar and pie charts.

In addition, Mountain High Software (510-939-7385, www.earthlink.taxprogram.com) has created 16- and 32-bit versions of TaxTime (\$24.95) for 1996 tax returns. These standalone products contain spreadsheetlike files, one containing the program instructions and another presenting the approximately 50 included forms and schedules in a workbook format. TaxTime integrates all of the necessary documents and makes all of the calculations for you. Mountain High Software also has a California state tax program for 1996 returns that is available with the federal version for \$34.95.—KY



TaxDollars, an OS/2 tax-preparation package from BT&T Consumer Technology, is back this year.

progress through your return. These are all welcome modifications and are enough to maintain the distance between TurboTax and its competitors.

Like Kiplinger TaxCut, TurboTax has been graced with a new look this year. Every element on the screen—

text, graphics, buttons, videos and their playback controls—has been refined, resulting in a crisper, cleaner look.

If you've been faithfully tracking income and expenses in Quicken, you can use TurboTax's TaxLink feature to import them. You can also

transfer data directly from last year's TurboTax or from any other financial package that exports .TXF-format files.

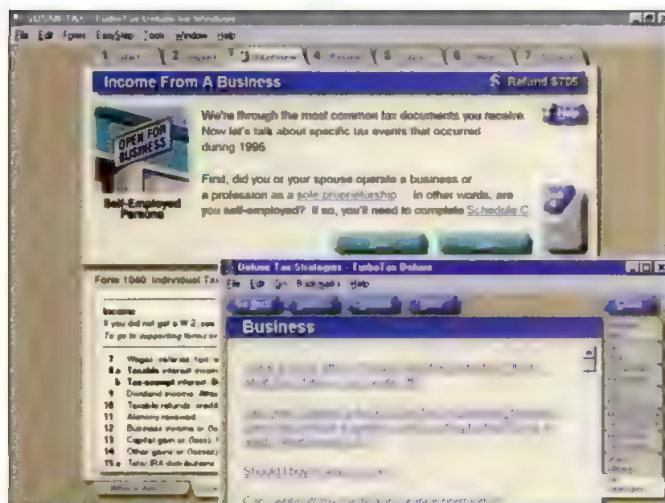
That completed, you can launch either into TurboTax's interview or into direct-data-entry mode. The interview works much as it has in the past: Questions appear in the top window,

and you can toggle the bottom window between a view of the current form and a list of the main interview topics. To save wear and tear on your mouse finger—and move you faster through the grueling process of tax preparation—Intuit has shortened the interview, combining several questions that used to be posed on separate screens. And you can now make some changes directly on the forms during the interview. Also new this year: You can keep track of exactly how much

you owe or are owed at any point in the preparation process by glancing at the figure on the Refund Monitor in the upper-right corner of the screen.

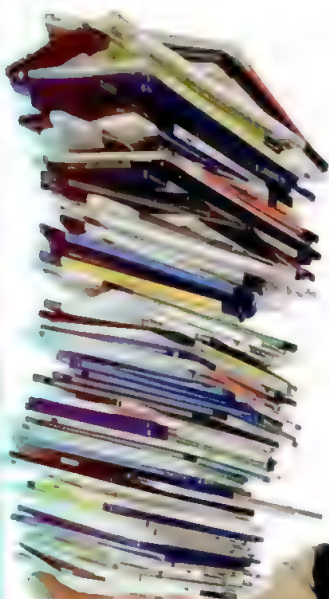
Direct data entry is just as easy to navigate as the interview. Click on the magnifying glass next to the current field and the appropriate forms or schedules appear on-screen. Click on the Form Errors button to see a list of problems with your return so far. You can also access program help, look at IRS instructions, and play any of the video clips. Also available are the full texts from *How To Pay Zero Taxes* and *The Money Income Tax Handbook*.

We have yet to see a tax-preparation program that addresses every possible inconsistency, error, and potential problem that a tax return can have, but TurboTax does a bet-



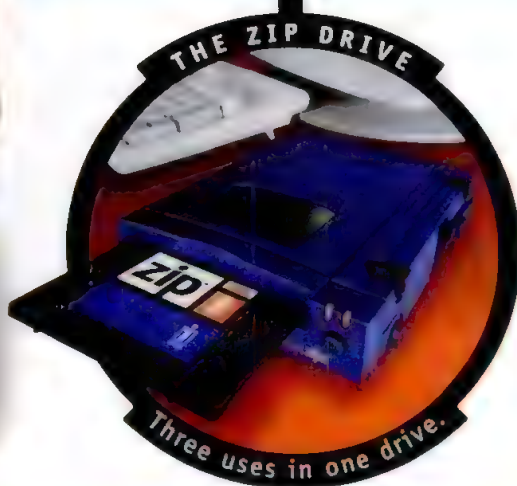
TurboTax Deluxe offers multiple layers of assistance ranging from basic tax and program help to detailed guidance.

REPORT CARD		
TurboTax Deluxe		
	Power Ease	
Preparation	A	A
Guidance	A	A
Audit/review	A	A



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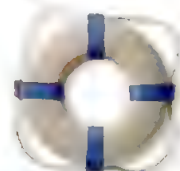
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Whether you're a tax professional or someone who uses tax preparation software to file their own returns, sooner or later, you will learn about bad power first hand. The electronic tax return that takes 40 plus hours to complete can take only a millisecond to destroy. Bad power is the single largest cause of

computer hardware damage and data loss. Not only is your electronic tax return in jeopardy, but also the computer records you use to complete it.

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AT HOME

Tax-Preparation Software

ter job than most. It looks for errors and absent information, flags possible IRS audit triggers, and alerts you to deductions you may have missed. It also provides a list of tax-saving suggestions.

Intuit provides state tax editions for every state having income tax; it also includes a State Assistant feature that walks you through the steps necessary to complete the return. You can print and mail it to the IRS, complete an abbreviated 1040PC, or file electronically. The program's What-if? Analysis tool also shows how changes in your financial status might affect future returns.

We looked at the Deluxe version of TurboTax, but Intuit also sells a basic version for \$34.95. The two are identical except that the basic version does not offer the same wealth of reference material and video clips. TurboTax doesn't have many online hooks, but it does include a special edition of Netscape Navigator and gives users free access to Intuit's Web site.

TurboTax Deluxe costs more than the other packages in this roundup. Yet it's also the most mature and well-designed product of the group. **TurboTax Deluxe.** List price: \$49.95. Intuit Inc., San Diego, CA; 800-446-8848, 619-453-4446; fax, 800-756-1040; www.intuit.com/turbotax. *Circle 443 on reader service card.*

Total Peripherals Inc.

U.S. Tax

The tax software category has a new face this year. U.S. Tax, from Total Peripherals, attacks the market leaders at their most vulnerable spot: price. For only \$19.95, U.S. Tax provides some of the core functionality offered by Intuit's TurboTax but misses critical elements

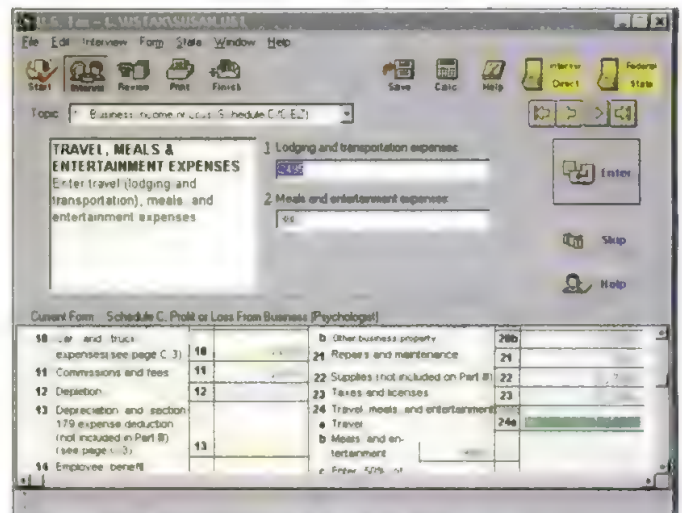
such as guidance and interpretation, data-entry tools, an ample variety of IRS forms and schedules, and a shoebox or filing cabinet for miscellaneous income and expenses. Although it could have been a contender a few years ago, U.S. Tax comes into the market too late—with too little—to challenge TurboTax or any of the other products seriously.

U.S. Tax includes a full complement of the primary IRS schedules (A through SE). And although the program's basic forms will meet many users' needs, U.S. Tax does not offer nearly the number that its competitors do. The package supports only a handful of state forms (California, Georgia, Maryland, Massachusetts, New York, and Pennsylvania).

U.S. Tax offers two methods for entering data: an interview and direct, on-form entry. No import feature is provided.

The interview works similarly to those features in U.S. Tax's competitors. A pull-down list in the upper-left corner of the screen contains a roster of the tax topics covered. You can either jump to the sections that pertain or follow the interview sequentially by answering each question as it comes to you. You'll click either Yes or No, enter information in the data box, and then click Enter. Click Skip if you want to leave a field unchanged and return to it later. The current form is displayed on the bottom half of the screen and is updated as you enter data.

A click on the light-switch graphic on the upper right toggles between interview and direct-data entry. A red arrow next to each line opens a list of options on the return. These include such features as accessing the calculator, overriding an



U.S. Tax has a clear, understandable interface that makes it easy to find your way around.

entry, and opening an itemization worksheet. One omission here: There is no option to jump to a supporting form or schedule, something that other tax programs have offered for years. Double-clicking on a line that grows out of a supporting document takes you to that document, but only in interview mode, not in data entry.

There's a dearth of tax help and guidance in U.S. Tax, especially when you compare the program's instructions with the far more helpful guidance offered by programs such as TurboTax Deluxe and Kiplinger

TaxCut. Some IRS instructions are available within the program, and a set of IRS booklets is installed in the program group in .PDF format and with the necessary copy of Adobe Acrobat for viewing.

U.S. Tax provides error checking throughout your tax-preparation process. Questionable entries are flagged as you make them. When you've finished, click on the Review button to call up a list of all your entries. When you highlight an entry, its line is dis-

played on the form below the Review window. You can make changes here if you'd like. Clicking on the Next button takes you to a list of possible omissions or data-entry problems. Here too, the appropriate form appears below, ready for your changes.

U.S. Tax prints IRS-approved forms and schedules. Although it generates 1040PC forms, you cannot file returns electronically directly from the program.

Total Peripherals has done a lot of things right with its inaugural edition of U.S. Tax, providing a great deal of tax-preparation power in a usable interface that lets you concentrate on your taxes, not on learning a new program. But it lacks depth in taxpayer guidance and data-entry aids, supported forms and schedules, and Internet connections. If you don't want to spend a lot of money on additional tax software, you'd be better off with Personal Tax Edge. □

U.S. Tax. List price: \$19.95. Total Peripherals Inc., Northboro, MA; 800-613-5157; fax, 508-393-9211; www.totaltax.com. *Circle 444 on reader service card.*

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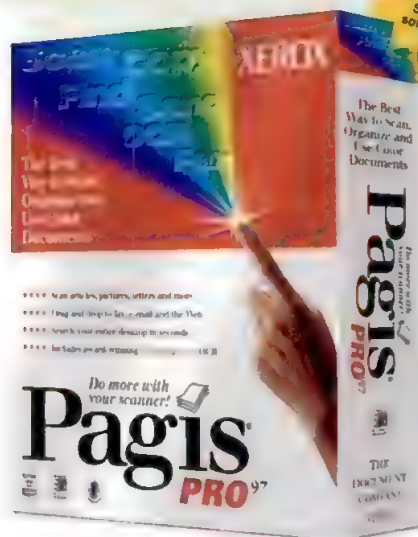
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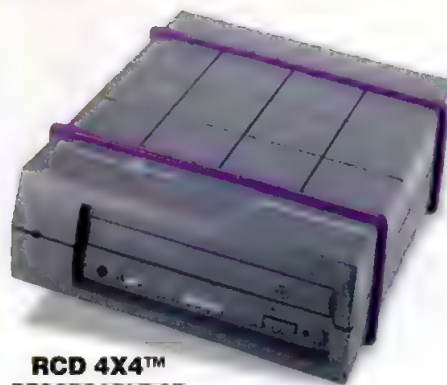
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Coming Up

What's in the Next Issue of *PC Magazine*

Personal Web-Page Tools

Tired of coding your Web page manually in HTML? These 13 Web-page editors help you create a page without coding. Also check out the HTML capabilities of suites from Microsoft, Lotus, and Corel, plus several high-end HTML authoring packages.

Adapting Graphics to the Web

Get that graphic! We test 17 utilities for building image maps, creating animated .GIF files, optimizing limited color palettes, and applying anti-aliasing to small images.

Color Flatbed Scanners

Need to post images to the Web or e-mail those family photos to Grandma? We test a range of scanners aimed at home, corporate, and professional graphics users.

Midrange Digital Cameras

That \$500 digital camera is fine for low-resolution Web images. For finer work, we test six professional-level units that cost upwards of \$7,000 but produce images good enough for print.



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For information about the Network Edition of *PC Magazine*, call Circulation at 800-289-0429.

Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

Yowch! Marriage Takes One On the Chin

Some of the more traditional staffers at *PC Magazine* were a tad dismayed to receive a press release from Simon & Schuster Interactive promoting a CD-ROM entitled *The Girlfriends' Interactive Guide to Pregnancy*. A title like that certainly begs the question of how the *boyfriends* got off so easy.



"OK LARRY, ENOUGH ABOUT THE ELECTION. LET'S TALK INTERNET BROWSERS. NEITHER ONE OF THE TWO BIG ONES ADEQUATELY REPRESENTS THE USER, WHICH IS WHY I PLAN TO LAUNCH A THIRD ALTERNATIVE—THE 'REFORM BROWSER'."

Yeah, and We Can't Find the LA/Honolulu Freeway Either

"Hawaii has been located on the map with ease of use in mind. Therefore, it is not located in its real geographic location relative to the mainland. A box has been drawn around the Hawaiian Islands to highlight this fact."

—RAND McNALLY TRIPMAKER 1997 DOCUMENTATION

If your entry is used, we'll send you \$50 and a *PC Magazine* T-shirt. Send your entries to: Abort, Retry, Fail?, *PC Magazine*, One Park Ave., New York, NY 10016-5802 or, via e-mail (text items only), to don_willmott@zd.com. Winners this issue: Boris Gorelik, Jorge Leyton, and Peter Louis.

Made In The U.S.A.

THE INTERNET COMPATIBLE MOUSE PAD

Successful marketing strategies, 1997 style.

Overheard

"MiniCad, to me, is the perfect choice to create killer cockroaches. However, I would like to remind people that MiniCad can be used for good as well as evil."

—Diehl Graphsoft president Richard Diehl, commenting on MiniCad's appearance in an episode of *"The X-Files"* called "War of the Coprophages."

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to talk
about a
lady.

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ARF on the road: Kingston, Ontario, Canada.

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ANNUAL GUIDE TO COMPUTERS				
Laptops				
TRAVELING COMPANIONS				
Some Popular Pentium Notebooks				
RANK	MODEL/PRICE	PROCESSOR	CONFIGURATION	COMMENTS
3.1	DELL COMPUTER \$2999	Latitude LM P133ST, 12-in. TFT display, (133 Mhz)	6.8 Ib 16MB RAM, 810MB disk, 6X CD-ROM	Great
2.8	IBM PC CO. \$6799	ThinkPad 760ED 1, 2-in. TFT display (133 Mhz)	1.7GB disk, 4X	
2.8	WINBOOK COMPUTER \$3999	WinBook 11.3 (133 Mhz)		
2.7	COMPAQ COMPUTER \$6398			
2.7	HEWLETT- PACKARD \$6120			

— *Business Week*,
November 4, 1996 —

What's wrong with this picture? The notebook that gives you the most performance, usability and features costs half the price of notebooks that give you less. (Notebooks, by the way, that you probably thought gave you more.) And remember, you have this information on the very best authority. *Business Week*, the business publication, in their Second Annual Computer Buying Guide cited the Dell Latitude LM P133ST as "the top ranked machine in the tests" and the notebook they'd most like to travel with. So if you're shopping for a notebook, buy the best. After all, you can afford it.

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- ★ PC MAGAZINE EDITORS' CHOICE AWARD - XPS Pro200n
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- ★ 4-time PC WORLD POWER DESKTOP BEST BUY - XPS P200s
- ★ 5-time WINDOWS MAGAZINE RECOMMENDED LIST - XPS Pro200n
- ★ PC COMPUTING BEST AWARD - XPS Pro200
- ★ COMPUTER SHOPPER TOP 100 AWARD - XPS P166s
- ★ 5-time PC WORLD POWER DESKTOP BEST BUY - XPS Pro200n
- ★ WINDOWS MAGAZINE WIN100 '96 HARDWARE AWARDS - XPS line
- ★ PC WORLD HOME DESKTOP BEST BUY - P200v
- ★ 8-time WINDOWS MAGAZINE RECOMMENDED LIST - XPS P166s
- ★ PC COMPUTING 4 STAR AWARD - XPS P200s
- ★ PC WORLD BUDGET DESKTOP BEST BUY - P200v
- ★ 11-time WINDOWS MAGAZINE RECOMMENDED LIST - P100t
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- ★ 2-time WINDOWS MAGAZINE RECOMMENDED LIST - P200v
- ★ PC WORLD BUDGET DESKTOP BEST BUY - P133v
- ★ WINDOWS MAGAZINE WIN100 '96 HARDWARE AWARDS - DIMENSION line
- ★ PC MAGAZINE EDITORS' CHOICE AWARD - XPS P133c
- ★ PC COMPUTING BEST AWARD - XPS P166c
- ★ 5-time PC WORLD BUDGET DESKTOP BEST BUY - P75t
- ★ 8-time PC WORLD POWER DESKTOP BEST BUY - XPS P133c
- ★ 2-time WINDOWS MAGAZINE RECOMMENDED LIST - XPS Pro200
- ★ PC WORLD BUDGET DESKTOP BEST BUY - P100t
- ★ 3-time PC COMPUTING 4 STAR AWARD - XPS P166c
- ★ PC WORLD HOME DESKTOP BEST BUY - P100t
- ★ 2-time WINDOWS MAGAZINE RECOMMENDED LIST - XPS Pro150
- ★ 5-time PC WORLD BUDGET DESKTOP BEST BUY - XPS P120c
- ★ PC COMPUTING 4 STAR AWARD - P100t
- ★ PC WORLD POWER DESKTOP BEST BUY - XPS P90c
- ★ 3-time WINDOWS MAGAZINE RECOMMENDED LIST - XPS P166c
- ★ PC WORLD BUDGET DESKTOP BEST BUY - XPS P90c
- ★ PC WORLD POWER DESKTOP BEST BUY - XPS P166c

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